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HOSPITAL BED NEEDS
Vane M. Hoge

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SANITATION OF SOFT-DRINK BOTTLING PLANTS
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ABSTRACTS OF 19 PAPERS PRESENTED AT THE 1957 CHRISTMAS MEETING OF THE LABORATORY SECTION

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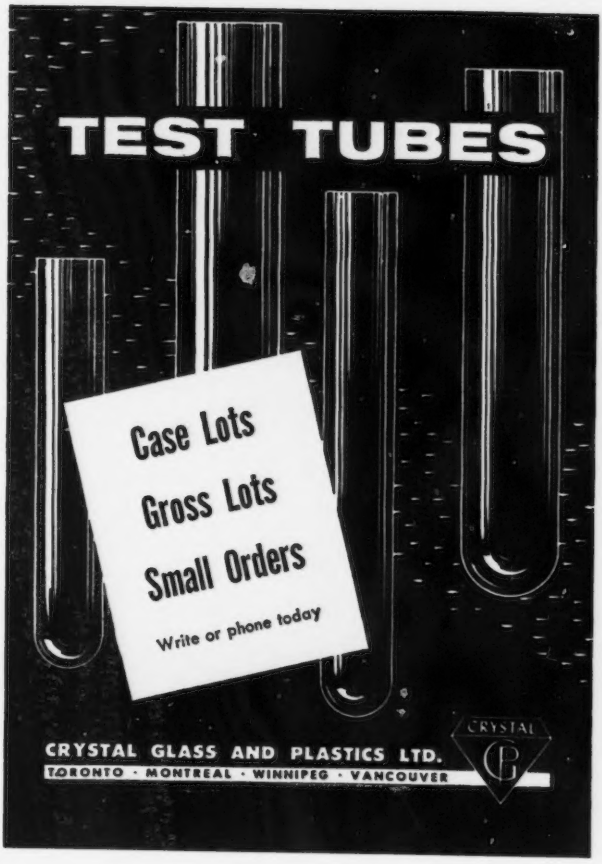
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VOLUME 49 TORONTO, JANUARY 1958 NUMBER 1

Hospital Bed Needs[1]

A REVIEW OF DEVELOPMENTS IN THE UNITED STATES

VANE M. HOGE,[2] M.D.

IT is a distinct pleasure to be with my friends in the Canadian Public Health Association to review the development in the United States of thinking and practice about hospital bed needs. In many ways our development of hospitals has grown out of circumstances peculiar to our own political and social conditions. American practice today is not identical with Canadian practice, although its basic values and assumptions are similar. It is good to be able to talk with you about our past and present thinking on facility needs.

Early Hospital Development

There were no hospitals of record in the early American colonies. Our earliest efforts for the care of the sick were incidental to shelter for the poor and unfortunate through alms houses. The first of these was founded in Philadelphia by William Penn in 1713. Similar alms houses were established shortly after this in New York and Charleston. The famous Charity Hospital in New Orleans, dating from 1737, was originally both a hospital and an asylum for indigents. About this time, also, a number of seaport towns were establishing crude isolation hospitals as a quarantine protection against contagious diseases. All of these early efforts were nearly a century later than your earliest hospitals established under church auspices in Quebec and Montreal.

The first bona fide hospital in the United States solely for the physically and mentally ill, without regard to economic status or race and creed, was established in Philadelphia in 1751, and was known as the Pennsylvania Hospital. Philadelphia at the time was the richest and largest city in the Colonies. It

[1]Presented at the forty-fifth annual meeting, Canadian Public Health Association, Toronto, May 28, 1957.

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is interesting that the project was launched by a grant from the Pennsylvania Assembly amounting to 2,000 pounds, conditioned on equal popular subscriptions, under a proposal devised by the ingenious Benjamin Franklin. Many of the early beginnings were related to need for a hospital which would provide clinical practice for medical schools in New York, Massachusetts, and Connecticut. The early hospitals were chiefly of voluntary sponsorship, outside of public or church support, and in this respect evolved in a different pattern from European hospitals.

The Rise of Planning

Until the early decades of the 20th century the development of hospitals was largely upon a local basis, to meet community estimates of needs without any effort at real measurement of these needs. Conscious planning for need upon a numerical measurement of requirement dates from about 1920. In this year the New York Academy of Medicine began an extended study of 180 private and municipal hospitals in greater New York City. It was claimed to be the most extensive study of its kind at that time, at least in the United States. Its purpose was to find out whether or not there were enough hospitals in New York City to care for all sick people in New York in need of these services. Its report, published at the end of 1921, found a total inventory of one bed per 200 population, and concluded that on the basis of the approximate number of sick persons, one bed was available for every fourth sick person and that this was sufficient. The report recognized the need for a central group or bureau which would facilitate the utilization of beds and exchange of information. From this report dates the beginning of formal planning for hospital needs in the United States.

Concepts of what is required for adequate care continued to expand, along with improvement of training in medical and hospital practice and a wider public understanding of the means for ensuring better health. Rising levels of income also contributed to demand for hospital care and related services. The hospitals themselves have developed strong state hospital associations, helping to improve operating practice and concern with long-range planning.

The economic stringencies of the depression years after 1930 in the United States led to virtual cessation of new construction. This was followed by inability to provide men and materials for construction during the years of World War II. Consequently, a mounting demand and increasing shortages focused national attention on the need for hospital facilities as a major aspect of postwar planning, while the need for assessing actual needs systematically became increasingly urgent.

The Era of Grants-in-Aid

The federal government has played a major role in encouraging and leading this postwar maturity in planning for total need for health facilities. The device employed to achieve this planning has been federal grants-in-aid for construction, after careful inventory and planning.

The era of grants-in-aid may be said to date from 1933. Its first use, during the depression years, was conceived to provide hospitals as public works. During this period federal assistance, up to 30%, contributed to the building

of 51,000 beds on non-federal projects, besides 10,000 beds which were federally owned. About one-third of the federal assistance was for mental hospitals, and one-third for general hospitals, with tuberculosis hospitals receiving about 18% of the total. The second venture in federal assistance was made during World War II, through grants under the Lanham Act for defense purposes and the war effort. This involved both direct grants and loans. This program produced over 800 health facilities, one-third of which were federally owned, at a total federal outlay of about $120,000,000. These facilities included over 300 general and special hospitals, together with health centers and nurses' training facilities.

The principle of grants-in-aid for hospital construction was further developed with the passage of the Hill-Burton Act in August 1946, providing assistance to local communities for hospital construction on the basis of medical need. Under this program federal aid was granted to the extent of one-third of the capital cost. Projects were selected strictly on the basis of relative need after comprehensive surveys made in each state. In 1949 the Act was amended to increase the authorization from $75,000,000 to $150,000,000 annually. The amendment also changed the percentage of federal participation from a flat one-third to a variable rate of one-third to two-thirds, in recognition of the varying economic levels of the states.

The scope of the program was further expanded by the Amendments of 1954 to include facilities for care of the ambulant and long-term patient in diagnostic and treatment facilities, chronic disease hospitals, nursing homes, and rehabilitation facilities. In 1955 federal funds were provided on a limited basis for research in hospital planning and management.

Nature of Federal Aid Program

The basic program of federal aid for construction of hospitals and medical facilities in the United States is somewhat different in nature from the National Health Grants Program in Canada. It differs in these respects:

- It takes directly into account the relative income per-capita of the States, in apportioning the annual appropriation.
- It varies the matching ratio required, according to state income levels.
- It supplies the same percentage of federal contribution for all categories of hospitals.

In brief, the distinguishing features of the federal aid program in the United States are the following:

- A state-wide inventory of all existing facilities in each category.
- A program for the quantity and location of all additional facilities required, according to prescribed minimum standards of need.
- A priority system based on relative need among general hospital service areas.
- Local matching funds either upon a uniform basis within a state, or under a variable plan based on relative need and financial ability of the areas served.
- Grant eligibility for all except proprietary facilities.
- Minimum standards of design for functional adequacy and safety.

- State-wide planning and administration performed by a single official state agency, as an intermediary between the local community and the federal government.

It may be noted that the states are required to identify all existing beds which are unsuitable, because of physical hazards and serious functional obsolescence, and to eliminate such beds from the count of existing facilities in planning for future requirements.

Physical Achievements of the Hill-Burton Era

Physical achievements in adding to our hospital plant in the United States have been very substantial in the Hill-Burton era since 1947. The annual inventories contained in state hospital plans under the Hill-Burton program show a net increase from 1947 to 1956 in the total number of hospital beds in the United States and its territories amounting to 242,000 beds. These figures exclude federal facilities. Of this number, 148,000 are in general hospitals, and 68,000 in mental hospitals. The remainder is about equally divided between tuberculosis and chronic care hospitals. The magnitude of this new construction is best understood by comparison with the total number of acceptable beds reported at the beginning of the Hill-Burton program, which was about 865,000. The increase, accordingly, amounts to 28%. The net national gains, in relation to population, are not as striking as these figures would indicate, because of our rapid growth in population and because of the progressive removal of obsolete beds from the count of acceptable facilities, through more exact application of standards of acceptability. We now have in the United States about 7.4 acceptable beds per thousand population, including all categories of hospitals and all types of ownership, a gain of 0.6 beds per thousand population since 1947. The contribution of the Hill-Burton program of federal aid has provided slightly over two-thirds of the net gain in acceptable beds in each category, except for mental hospitals. Major expansion programs of state governments have accounted for the bulk of the increase in this category, but here also Hill-Burton aid has produced 20% of the net gain.

Indirect Consequences of Federal Aid

The indirect consequences of federal aid in the United States have been notable. In the long run, they may perhaps come to be regarded as even more important than the actual gain in quantity of hospital facilities provided. The chief of such consequences has been the application of systematic state-wide planning throughout the country, at a single stroke. Previously, no comparable efforts were under way in any state, although studies for limited areas were frequent. Naturally, the degree of skill and effectiveness brought to this large-scale planning varied with the size and resources of the several states. Nevertheless, the innovation was epic-making in its nature, and was achieved by incentives, rather than by fiat.

The advent of systematic planning entailed the use of standards. Three different kinds of standards were involved. The first type of standard relates to quantity: How much, or what kind of facilities are required? Subsequently,

standards of quality were introduced, in order to define what is "adequate". Besides quantity and quality in measuring needs, yardsticks were essential for the manner of distribution of facilities within a state.

The second type of standards related to design on any project. Minimum requirements were needed to ensure a safe and efficient structure for the purposes intended. This was simply good business, in order to protect the federal investment.

The third type of standards resulting indirectly from the program of federal aid related to operation. Here the federal Act merely required that the state should impose some minimum standard of good operating and maintenance practice, leaving details entirely to the discretion of the states. The result of this requirement was an entirely unexpected movement for state licensing laws applying to all hospitals and not merely to those receiving federal assistance. At the passage of the Hill-Burton Act in August 1946, only 12 states had general laws requiring licensing of hospitals. Today all but five or six have such general laws.

The third main consequence of federal aid has been greatly increased progress in providing facilities in areas of maximum remaining need. The priority system of the Hill-Burton program alone can not regulate all construction, but it has served to channel much more of the annual construction expenditure into areas of greatest shortages than would otherwise have been achieved. At the beginning of the Hill-Burton program, about 10 million people were living in 600 areas designated by state authorities as local hospital service areas, but which had no acceptable facilities. Today such areas are one-fourth as numerous and include only about 2.8 million population. The disparities and unbalance in hospital distribution are being equalized.

Evolution of Standards of Need

The evolution of standards of need for facilities and services is fundamental to any systematic planning for hospitals. The process has been largely empirical, but is coming to be founded on facts and scientific method. Many opinions and some facts have been published in the last 35 years in this field. For general hospitals alone, the Public Health Service recently compiled a list of over 70 references published in the United States and abroad, from a list of over 200 reviewed. No clear chronological trend was observable in the wide range of views set forth.

We may begin to examine the problem of standards of need for hospitals by reminding ourselves of the purpose of today's hospital. Today's hospital seeks not only to restore good health, but to maintain good health. This involves much more than hospital beds. It includes the whole constellation of supporting services which comprise the hospital.

At the very outset, in talking about hospital services we must distinguish between need for service and demand.

Need for hospital service is a medical concept. It is that level of service required for the most effective diagnosis and treatment, within scientific knowledge, to restore or preserve good health. **Demand for service** is a result of this need, as it is influenced by the understanding, readiness, and financial

ability to use hospital services on the part of a particular person or population group at a given time, and at going rates for service.

In general, effective demand in the United States is less than true need. Medical need at a given time will be broadly similar for large population groups, such as entire states, but may differ materially among communities, by reason of climatic conditions, the age distribution of the population, industrial hazards, and the prevalence of principal diseases.

It is evident, from the wide variety of factors that influence need and demand, that many aspects should be examined, and measured where possible, if the resultant requirements are to be fixed with any degree of precision. This will distinguish between hospital services appropriate at primary medical centers, regional centers, and community hospitals.

For the last quarter-century professional committees and individual experts in planning medical care have regarded the ratio between population and the number of hospital beds needed as the principal yardstick of measurement for service. The beds themselves are a symbol of many services, but such ratios provide a workable tool of great value. Other measures, such as annual patient-days, are useful as well. Facilities for outpatient care require a different kind of standard, such as square feet of floor space or annual number of visits.

In the historical development of standards, estimates of bed ratios needed have fluctuated materially. The early tendency toward higher standards of need was reversed with the decrease in the average length of stay. Twenty years ago the average stay in all American general hospitals was about 15 days. It is now about eight days. A basic ratio of 4.5 beds per thousand population for general hospital need was established in the Hill-Burton Act of 1946. It reflected the general consensus of the time as to actual need for general hospital beds nationally and state-wide. Legally, this standard was only a limit beyond which federal assistance would not be provided for construction, but it was applied by regulations as a minimum standard of adequacy.

Similar ratios under the Act were five beds per thousand population for mental hospitals, and two beds per thousand for chronic care hospitals. Standards of need for tuberculosis beds were related, according to the best judgment of the time, to the mortality rate, since tuberculosis varied very widely in its prevalence in different regions of the country. Under the added scope of the Hill-Burton program authorized in 1954, nursing homes are being planned according to a flexible scale of from one to three beds per thousand population, at the discretion of the states. This ratio may be adjusted to four beds, with an increasing decrease in chronic hospital beds planned for, if the state so elects.

The initial Hill-Burton standards for tuberculosis bed requirements were modified by administrative action recently, when it became apparent that the rapid decline in mortality rate made this standard unrealistic. Tuberculosis beds are now planned at the rate of 1.5 times the reported incidence of active and probably active new cases, averaged for the most recent two-year period available. This formula is under continuing study.

Most uncertainty prevails as to proper standards of need for mental hospital facilities. We have made a start in building psychiatric units in general hospitals, for early diagnosis and treatment to reduce the need for long-term care.

Major research is under way, both on clinical aspects of mental illness and on hospital and outpatient service in this field. We find that the states are planning for a wide range of bed ratios, below and above the Hill-Burton standard of five mental illness beds per thousand population.

There are several major elements of change which are significant in our continued development of standards of need for hospital facilities. The first of these is the new developments in therapy, some of which require additional hospital service, but which may result in substantially shorter stay. Surgery, as well as chemotherapy, may increase immediate requirements for facilities, but, in the long run, may diminish the total hospital load. A second element of change is the great expansion of auxiliary and supplemental facilities providing care below the level of that needed by patients with acute illness. These facilities include convalescent and nursing homes and diagnostic and treatment centers, as well as rehabilitation facilities for patients not needing inpatient care.

Another aspect of change is the increasing use of plans for spreading the cost of financing hospital care. In the United States we have no large-scale counterpart of the plans for publicly-financed care in effect in British Columbia and Saskatchewan. Nationally, our present level of hospital insurance coverage is about 63%, according to a recent survey by the Public Health Service, but there are many gaps in segments of the population not covered.

A study for the year 1951 was made as to the volume of hospital service actually utilized, where economic barriers have had a minimum effect on the receipt of care as needed. This study included population of twelve states with the highest income per capita and nine states with the highest percentage of births in hospitals. It also examined comparatively the universal prepayment programs in Canada. This study indicated a need for about 2,000 days of service annually per thousand population in institutional care. Of this, about 1,300 days were indicated for hospital care, including both acute and chronic disease. The remainder would be institutional care of convalescent and long-term cases not needing active medical treatment. These data may no longer be entirely valid. However, they support the presently-used basic ratio under the Hill-Burton Act of 4.5 beds in general hospitals per thousand population and suggest that our standard for long-term care is probably low.

Current Problems

Recent net gains in adding to the health facilities of the United States and our changing medical practice make the redefining of standards of need more urgent than ever. By current standards, we now have three-fourths of our requirements for general hospital beds. The shortages in tuberculosis facilities are rapidly disappearing. We have little positive assurance at the moment about the validity of measures of need for facilities to care for mental illness. The evolving pattern of care for long-term illness involves experiment and testing with a series of facilities which will furnish a graduated scale of services suited to the patient's needs. We do not yet have the measure of actual need for comprehensive rehabilitation facilities, although this area of effort pays high dividends in restoring disabled people to productive life.

There are also unsettled problems as to the most suitable distribution of

facilities. Planning for the urban fringe of large cities is one such "blind spot". It is clear that the central city will continue to serve the suburbs to some degree, through its hospitals and medical specialists, although ready access to local facilities and services in the fringe area is an obvious requirement of our larger metropolitan areas.

A good beginning has been made in basic research for these fundamental problems of long-range planning for health facility needs. Federal funds are assisting in several comprehensive studies of large metropolitan centers in Kansas City and Boston. An independent survey of needs is being completed by the Health Department of California. The Public Health Service itself has conducted a national household survey through the Bureau of the Census, as to the existing level of hospital use, on a sampling scale representing about one in 1900 of the country's population. The study will make available the circumstances attending different levels of use, with respect to population characteristics, geographic distribution, economic ability, and extent of prepayment coverage for hospital care. It is intended to point the way to more intensive studies of the conditions attending maximum use. The Public Health Service also has been directed by the Congress to conduct a continuing health survey on a national scale. Preliminary testing of its techniques is now under way.

Summary

We have made rapid progress in recent years in coming to grips with the national problem of providing health facilities. For ten years we have done state-wide planning. We have working rules for standards of need which serve as a practical guide. We are now beginning to adjust and refine our standards. The process is slow and expensive, but we have confidence that real advance is in sight. In five years we expect to know much more about our needs, in documented facts. In ten years we may have true standards. As always, public knowledge and understanding must follow along with technical developments, and support the action necessary to put such standards into practice.

NATIONAL HEALTH WEEK

Canada's fourteenth consecutive National Health Week will be celebrated during the first week of February, 1958. This outstanding contribution to the promotion of health is organized by the Health League of Canada in co-operation with departments of health and education across Canada. It is part of the continuing program of the Health League to stress the importance of good health. National Health Week has grown to the stature of a national institution. The objective of Health Week is to make everyone conscious of the value of good health and the importance of taking the trouble to keep it.

The Health League has supplied informative literature suitable for newspaper releases and radio and television announcements. The response of the press has been most generous and a number of sponsored advertisements have been published. The fourteenth National Health Week promises to have even larger coverage than in previous years and to merit its place as the greatest single annual publicity event in health work in Canada.

Earlier Physical and Mental Maturity Among Saskatoon Public School Children

GRIFFITH BINNING,[1] M.D.

DURING the past half-century a definite increase is reported to have occurred in the physical size of school children in the United States and Great Britain. Uusally, the investigators have had little or no control over the techniques used in measurement or in the handling of data and it has often been difficult for them to compare the same specific geographic areas between the years of measurement. Often too, the data were obtained by sampling. The observations were only as valid as the samplings allowed and even with the best intent and greatest skill, unknown factors could influence the observations. In this study identical techniques of measuring and identical methods of handling the data were used in 1936, 1946 and 1956 and in each decade all children present in school were measured. Saskatoon public school children comprise nearly 90% of all elementary school children in Saskatoon.

Methods

In each decade our techniques of measuring were unchanged. Ages were determined from proof of age furnished when the child first entered school and ages herein were to the nearest birthday. It should be remembered that local children begin school at the first of September of the year in which the child has its sixth birthday and thus our 6-year-olds comprise the eldest nine months' section of all 6-year-olds. Further, many of our 14-year-olds normally have graduated, while all 15-year-olds are at least one year retarded.

On each occasion, the measuring occurred in mid-winter. During the 20-year interval between the first and third measurings the weight of clothing worn indoors lessened considerably. It was, except for 6- and 7-year-olds, about one pound lighter in 1956 than in 1946 and 1936. It is, indeed, somewhat shocking to those from warmer climates to observe our children in school today in slippers, bare legs and ankle socks, light panties and a light dress on a day when the outside temperature may be below thirty degrees below zero with a high wind blowing. Yet, with indoor temperature invariably at least 72 degrees above, and with warm overboots, heavy ski pants and heavy coat with hood for outside wear, the clothing today is most sensible. Our children were measured in stockinged feet with jackets removed, on beam scales. The weight was recorded to the nearest pound.

Provided with accurate scales anyone can measure weight, but persistent care and skill are required to measure height accurately. Our method was as follows: a rule was solidly attached to a clear section of the wall of the medical inspection room. The child stood with its back to this rule, head level "looking out the window". A deep cigar box was gently placed on the child's head with its end firmly against the rule, the child was told to "stand tall" and the height noted. The command was repeated, possibly as "stretch up tall" and the height again noted. If the two

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measurings were similar the last was recorded as height. If there was a difference the procedure was repeated until a satisfactory measurement was obtained. With the above technique the child usually inhaled as he stretched which, according to Sheldon (4) eliminated diurnal variations in height. Height was recorded to the nearest inch. Two difficulties were not uncommon; if children with lordotic posture were placed with their heels against the wall as was commonly done, when told to "stand tall" they would shrink slightly. If the heels were kept out a bit from the wall shrinkage did not occur. Secondly, girls with the currently popular "pony-tail" hair-do were best measured in the same manner as the lordotic posture child.

During the measurement at the school, the measurements were recorded on separate sheets for each age-sex group. The standardized mean height and weight for each group were then calculated and entered on a large master-sheet so that the measurements for each school were in one column while each age-sex group occupied one line. In addition, the weight per inch of height was placed below the weight of the group. Our children in any year of measuring are closely similar in weight per inch in any age-sex group so that differences between schools were quickly noticed and remeasurement undertaken. When we were satisfied with the recordings the standardized mean weight and height for each age-sex group were calculated from frequency tables and are given in Table I.

TABLE I—THE STANDARDIZED MEAN HEIGHTS AND WEIGHTS OF SASKATOON PUBLIC SCHOOL CHILDREN IN 1936, 1946, AND 1956

Boys	1936		1946		1956		1936	1946	1956
Age	Nos.	Height	Nos.	Height	Nos.	Height	Weight	Weight	Weight
6	172	44.7	264	45.2	262	45.7	44.3	45.7	48.3
7	161	48.0	204	47.4	590	47.6	52.8	52.5	52.7
8	212	50.0	212	50.3	510	50.0	57.8	58.0	59.0
9	207	52.2	201	52.0	567	52.2	64.4	63.5	66.2
10	186	53.1	241	53.5	463	54.1	69.5	69.4	72.8
11	227	55.4	240	56.2	401	56.0	75.2	77.8	79.8
12	203	57.9	213	57.6	408	58.6	83.4	84.0	90.3
13	226	60.4	227	59.9	384	61.9	95.9	93.3	100.6
14	122	61.7	224	62.7	270	62.5	101.1	104.5	110.7
15	54	64.7	146	64.4	114	65.2	111.0	115.0	121.1
GIRLS									
Age									
6	207	44.6	259	44.8	271	45.7	42.6	46.0	47.2
7	181	47.8	242	47.3	523	47.2	50.8	49.6	51.0
8	206	49.5	185	49.8	470	49.6	54.7	56.2	57.9
9	162	51.8	193	51.0	558	51.8	62.1	60.1	63.5
10	181	53.8	210	53.5	413	54.1	67.4	68.1	72.4
11	193	55.5	199	55.1	383	56.5	76.0	75.6	80.3
12	225	58.3	203	58.4	370	58.1	86.5	86.0	92.1
13	196	60.9	187	59.4	376	61.0	99.9	96.6	102.0
14	117	62.0	196	61.9	221	62.5	105.2	108.3	110 7
15	37	63.2	91	62.7	79	62.5	107.8	112.3	117.1

The Observations

If Saskatoon children are compared between the various years of measuring or between districts, probably unless there is a change in height greater than one quarter of an inch or a change in weight greater than one pound it is unlikely that any real change in size occurred. In addition to change in height of 0.25 inch there can be added the requirement that it be accompanied by a change in weight of at least one pound in the same direction before height is considered to be altered.

Under the above restrictions when 1946 children are compared with 1936 children, the 6-, 11- and 14-year-old boys gained in height while the 13-year-old boys lost; among girls, the 8-year-olds gained and the 7- and 13-year-olds lost.

When weights alone are compared between 1946 and 1936 (Table I), among boys, the 6-, 8-, 11-, 14- and 15-year-olds of 1946 gained while the 13-year-old boys lost weight. Among girls, between 1946 and 1936 the 6-, 8-, 14- and 15-year-olds gained while the 9- and 13-year-old girls lost weight. Nor is there any suggestion in Table IV, in which weight per inch of height of the various age-sex groups in the different years is shown, that the 1946 children were heavier per inch of height than

TABLE II—Weight per Inch of Height

	Boys			Girls		
Age	1936	1946	1956	1936	1946	1956
6	0.968	1.011	1.057	0.955	1.026	1.032
7	1.100	1.107	1.107	1.062	1.048	1.080
8	1.156	1.153	1.180	1.105	1.128	1.167
9	1.233	1.221	1.268	1.198	1.178	1.225
10	1.308	1.297	1.340	1.252	1.272	1.338
11	1.357	1.206	1.425	1.369	1.370	1.421
12	1.440	1.458	1.540	1.483	1.472	1.585
13	1.587	1.557	1.625	1.640	1.626	1.626
14	1.638	1.666	1.771	1.696	1.749	1.771
15	1.715	1.785	1.857	1.705	1.791	1.873

1936 children. All in all, it would appear safest to believe that little real change in height, weight or nutritional state occurred among our children between 1936 and 1946.

Between 1946 and 1956 among boys the 6-, 10-, 12-, 13- and 15-year-olds gained in height while no age-group is shorter than in 1946; among girls, the 6-, 9-, 10-, 11-, 13- and 14-year-olds are taller in 1956 than in 1946 and no age-group is shorter in 1956. When weights alone are compared among boys, all ages are heavier in 1956, except that the 7-year-olds are 0.2 pound heavier; among girls, all ages are heavier except that the 7-year-olds are only 0.4 pound heavier. In no instance do children weigh less per inch of height in 1956 than in 1946 or 1936.

Children from three city districts are compared in Table III. Districts 1 and 2 are adjoining and are closely comparable with regard to parental occupation, socio-economic status and ethnic origin. The male parents are managers, senior clerks and highly-skilled artisans, mostly of Anglo-Saxon origin. District 1 consists mostly

TABLE III—The Heights and Weights of Boys in Three City Districts

	Heights			Weights		
Age	District 1	District 2	District 3	District 1	District 2	District 3
6	45.8	45.6	45.9	47.7	46.7	48.0
7	48.3	47.4	46.9	53.8	52.3	52.0
8	50.4	49.8	49.6	58.9	59.6	58.3
9	53.0	52.3	51.6	66.3	67.7	65.0
10	54.8	54.5	53.3	72.5	74.0	70.6
11	56.5	56.3	54.8	81.9	80.0	73.4
12	59.0	58.4	57.4	90.2	91.2	89.5
13	60.9	61.0	59.9	100.7	99.9	95.9
14	63.2	62.8	62.6	108.9	103.1	109.4
15	66.3	61.2	64.1	130.7	107.4	106.7

of new houses while district 2 has few homes built since 1947 and most homes are at least 10 years old. In district 3, parents are labourers with a scattering of tradesmen, and clerks. The parents are about equally of Anglo-Saxon and Ukrainian origin, and many suffer prolonged unemployment during the four or five months of winter, during which the family must live on savings, unemployment insurance and family allowances. This district is across the city from districts 1 and 2.

Only slight differences can be observed between the sizes of children in districts 1 and 2. Inasmuch as the difference between the districts among girls is similar to that observed in boys, the comparisons for girls are omitted. In district 1, 7-, 14- and 15-year-old boys are taller than similarly aged district 2 boys and no district 1 boys are shorter. The district 1 7-, 14- and 15-year-old boys are heavier but 9-, 10- and 12-year-old boys in district 1 weigh less than district 2 boys of the same age. In all, the 6-, 7-, 8- and 9-year-old district 1 boys average 0.6 inch taller and 0.3 pound heavier than district 2 boys; the 10-, 11-, 12- and 13-year-olds in district 1 average 0.25 inch taller but no heavier, while the 14- and 15-year-olds average 2.75 inches taller and 11.95 pounds heavier in district 1. Neither district has an advantage in weight per inch. In brief, children from the new housing district tend to be slightly taller but not heavier as compared with children from older housing districts.

On the other hand, except for the 6-year-olds who are taller and the 7-, 8-, 14- and 15-year-olds who are similar in height, children from district 3 are shorter than children in districts 1 and 2. The 6-year-old boys in district 3 are heavier than other 6-year-olds, but other ages except the 15-year-old boys in district 3 are lighter than boys in other districts. There exists little difference between the three districts in weight per inch of height in the various ages. This is interesting because the children were measured mid-way through the winter.

In Table IV, Saskatoon boys in 1936, 1946 and 1956 are compared with Toronto boys in 1923 and 1939 for height and weight. In making comparisons between the

TABLE IV—The Heights and Weights of Boys in Toronto and Saskatoon in Various Years from 1923 to 1956

	Heights				
Age	Toronto 1923	Saskatoon 1936	Toronto 1939	Saskatoon 1946	Saskatoon 1956
6	44.8	44.7	45.1	45.2	45.7
7	46.2	48.0	47.4	47.4	47.6
8	48.2	50.0	49.6	50.3	50.0
9	50.2	52.2	51.7	52.0	52.2
10	52.1	53.1	53.6	53.5	54.1
11	53.8	55.4	55.4	56.2	56.0
12	55.5	57.9	57.4	57.6	58.6
13	57.5	60.4	59.4	59.9	61.9
14	59.6	61.7	61.6	62.7	63.0
15	61.6	64.7	63.9	64.4	65.2
			Weights		
6	46.0	44.3	46.4	45.7	48.3
7	48.8	52.8	51.3	52.5	52.7
8	53.5	57.8	56.8	58.0	59.0
9	58.6	64.4	62.9	63.5	66.2
10	64.6	69.5	68.8	69.4	72.8
11	70.5	75.2	75.2	77.8	79.8
12	76.8	83.4	82.5	84.0	90.3
13	85.0	95.9	90.8	93.3	100.6
14	93.4	101.1	100.9	104.5	110.7
15	103.2	111.0	111.6	115.0	121.1

cities, probably it is wiser not to consider that any difference in height exists unless this difference is greater than one half inch, together with a weight difference in the same direction of at least one pound.

While among boys the 7-, 9-, 12-, 13- and 15-year-olds from Saskatoon were somewhat taller than the 1939 Toronto boys of the same age, 10-year-old Toronto boys were taller than Saskatoon 10-year-olds. All other age-groups were the same height in both cities in these years. Saskatoon 7-, 8-, 9- and 13-year-old boys were slightly heavier in 1936 than similar ages in Toronto in 1939. All other ages were the same weight in the two cities in these two years. Briefly, Saskatoon boys in 1936 were very slightly larger than Toronto boys in 1939 so that probably in 1936 Saskatoon boys actually were slightly larger, although the difference may not be significant.

Discussion

The heights and weights of school children in North America and Great Britain have increased each decade during this century, except during world wars, and while there would appear to be some difference in child size between the continents, neither Meredith in U.S.A. (1) nor Clements in Great Britain (3) found little difference in size between various geographic areas in each country. Our 1936 children were closely similar in size to those in Toronto in 1939. Saskatoon children appear to differ from those observed by Meredith and Clements in this respect: the children they observed had increased in size at all age levels while in Saskatoon there is failure to gain at the 7-, 8- and 9-year level for boys and the 7- and 8-year level for girls, although some weight was gained. This may be because the ten-year interval between measurings is too short a time to allow gains to show at this life period, one at which child growth normally slows. It may also be that as child growth is speeded up even more than at present, normal periodic slowings will become more apparent.

Our Saskatoon children show a very considerable gain in weight and in weight per inch of height between 1946 and 1956 that was not so apparent between 1936 and 1946 nor in other reports of childhood gains. This is in keeping with the clinical observation that as the incidence of thinness lessens the incidence of clinical obesity is increasing among our children and is occurring at a progressively younger age level.

There is little in this study to suggest why child growth has increased its rate. Among our children, weight per inch of height has increased since 1946, suggesting improved nutrition. Between districts there is little difference in weight per inch although height differences exist corresponding roughly to differences in socio-economic status. Yet, among our children, in the 1930's, drought and depression placed as many as 36% of the parents of our children on "relief" whereas by 1946 full employment at good wages had existed for at least five years, together with effective inflationary controls.

Some have suggested that better hygienic conditions and better housing are responsible for faster growing speed yet our tallest children of district 1 are not better housed and cared for than children in district 2. Some have suggested that the specific modern treatments, by drastically lowering the duration and severity of infections, may hasten growing speed. Yet the most common infection among school children is the common cold. Possibly the

greatest gain in child growing speed occurred in the 1920's before specific treatments existed. Our children undoubtedly were better fed in 1946 than in 1936 yet showed no gain. Clements observed that British children failed to increase their size during both world wars yet their growth increased during the depressed thirties. It may be that the 1939–45 war was responsible for failure to gain between 1936 and 1946. Locally, among our children, family separation following parental death, insanity, legal separation, or paternal enlistment in the forces, is far more certain to slow child growth than is serious illness of the child unless this should directly affect bone.

It may be more pertinent to child welfare to indicate briefly three areas in child life that may be affected appreciably by the co-existence of increased growing speed and better nutritional state. These are: mental ability and emotional growth, visual acuity in the school child and sexual development.

Mental Ability and Emotional Growth

It is not commonly appreciated that among large groups of children the faster-growing among them possess a higher intelligence quotient. Intelligence quotient is simply the child's mental age in months, as determined by a battery of test questions concerning general knowledge and educational experience, etc., divided by the child's chronological age in months times 100. Generally, in normal children, all aspects of child development proceed toward ripening at speeds that are definitely closely related to each other. Individual variations do normally occur but among large masses of normal children individual variations cancel out each other so that fairly narrow limits can be set for normality of the entire group. Hence, among a large group of children such as we are observing, when the speed of physical growth is increased one would expect to find the speed of mental growth to be increased and to be manifest on testing with intelligence tests as an increase in mental age and, because chronological age has been kept stationary, by a raised intelligence quotient.

It so happens that our children are routinely tested by intelligence tests while they are in grade VIII. In 1946–47 and in 1955–56 the test used was the Laycock Mental Ability Test. The following are the average test results for two grade VIII classes:

	Numbers	Standardized mean	Standard deviation
1946–47	535	103.70	14.61
1955–56	764	107.61	13.47

t equals 4.9; P greater than 0.0006.

Changes in Visual Acuity

About two years before puberty, there is a normal change of the average refraction from plus to minus; that is, at grade I level the average refraction is slightly hyperopic whereas after puberty the average refraction for large numbers of children is slightly myopic. Pathologic hyperopia and myopia sharply increase in incidence just before puberty in each sex.

Among faster growers, puberty normally occurs considerably earlier than among slow-growing children, provided that both groups of children are in good nutritional state. For instance, among girls approaching their first menstrual period those in good nutritional state menstruate considerably before those who are "too thin". Further, there is a rough but positive relationship between the degree of thinness present and the length of the delay in menstrual onset. A marked exception is the obese child, whose onset of menstruation may occur very early or equally late.

Because our children are both taller and heavier per inch of height in 1956 than in 1946, we would expect greater sexual maturity among our children just as we found greater mental maturity accompanying their greater size. Accompanying the earlier sexual maturation, there should occur a sharp rise in the

TABLE V—THE INCIDENCE OF LOSS OF VISUAL ACUITY IN PERCENTAGES SINCE 1929

Years	Grade I	Grade IV	Grade V	Grade VII	Grade IX
1929–36	3.6		15.0		20.0
1946–51	3.4	11.1		14.6	
1951–52	4.2	15.2		21.7	
1952–53	3.4	15.2		—	
1953–54	4.2	19.1		24.6	
1954–55	4.5	20.0		26.3	
1955–56	3.4	20.4		25.1	

incidence of loss of normal vision two or three years earlier in present children's lives than formerly. Reference to Table V will show that exactly this has happened. But there may be more occurring. Among our children, preliminary study indicates that children who lose normal visual acuity by the time they are 13 years of age have come to us in grade I taller and heavier than children who still have normal vision at 13 years; that both groups are the same height at 13 years is due to a slowing of growth among those who lose visual acuity at between 8 and 10 years of age. Concomitantly with this change in growing speeds between the two groups of children, the children who maintain normal visual acuity until they are 13 become relatively wider in their shoulder girdle width as it is related to the width of their pelvic crests, i.e., more mesomorphic in body type than do the children who lose visual acuity by 13 years. Others (5, 6) have observed that children who become myopic or suffer pathologic hyperopia are taller and heavier than children who maintain normal visual acuity, and that girls who lose visual acuity menstruate appreciably earlier than do girls who maintain normal vision.

The significance of the differences in the physical growth records of the above two groups is as yet little understood. If our preliminary observations are correct, why should a distortion or hesitation, for it is little more, of physical growth be accompanied by the onset of myopia or pathologic hyperopia in so many cases? It may be of significance that both the growth slowing and the onset of lack of visual acuity occur at an age in the child's life when normally the adrenal should sharply increase its secretion of its testoid hormones, themselves growth-promoting.

Sexual Development

It is regrettable that we can make no firm comparisons between the years as to the age at which puberty occurred, largely because we have insufficient data for 1936 and 1946. Tall girls in good nutritional state menstruate earlier than do short girls, while among girls of the same height who are approaching their first period those in good nutritional state will menstruate considerably earlier than girls who are "too thin". Indeed, there is a definite, if not too close, correlation between the amount of thinness existing and the length of the delay of menstrual onset among thin girls. As our children are taller in 1956 and in considerably better nutritional state there can be no doubt that puberty is happening considerably earlier than formerly. In addition, we now have to provide gowns to grade IV girls at their physical examination because of their advanced breast development at this early age, whereas before 1946 this was rarely necessary. Many grade VII boys are at 13 years showing adult development of their genitals and it is not uncommon for their mothers to express concern over the extent and earliness of their sexual development and the fact that their sons are now shaving regularly.

Socially, few problems appear to have arisen as yet out of the earlier sexual maturity that is occurring among our taller, better nourished children. After all, it is quite apparent that a 73-inch, 168-pound muscular 13-year-old boy who is shaving twice a week is no longer a child and parents and teachers seem to have accepted this fact instinctively and usually have adjusted management procedures of physically older children to their advanced physical and emotional age. Fortunately, any increase in sexual urge which must have occurred with their earlier sexual maturity has been, as shown, accompanied by greater mental maturity.

Other Physical Changes

Preliminary studies also indicate, as might be expected, that the diastolic blood pressure, which seems to increase at puberty more than does the systolic pressure, is higher among our taller children than it was some years ago.

There is also some indication, with confidence at the 5% level, that slow-growers are more prone to suffer diseases of bacterial origin such as scarlet fever. On the other hand, it is well known that poliomyelitis easily penetrates the best of sanitary and economic barriers to afflict in at least equally high incidence the faster growing children of the upper socio-economic groups. Among 534 1951 grade VII children the incidence of scarlet fever and of tonsillectomy by their grade VII physical examination according to the child's relative height in Grades I and VII is given below:

Disease %	Relative Height in grade I			Relative Height in grade VII		
By grade VII	Shorter	Average	Taller	Shorter	Average	Taller
Scarlet fever	14.7	13.0	4.8	17.9	12.8	10.2
Cases among those previously immunized	33.3	47.5	66.6	50.0	38.9	52.0
Tonsillectomy	27.4	40.9	53.2	29.8	37.8	48.3

It is observed that faster growers suffer considerably less scarlet fever by the time they are in grade VII although faster growers who have been immunized at least once against the disease are less prone to be protected by the immunization. On the other hand, possibly because of the higher socio-economic status of the faster grower, taller children are more prone to have suffered tonsillectomy. Unfortunately for contrast, there were no children in this group who reported having had poliomyelitis. After the local epidemic of poliomyelitis in 1952 it was observed that all children who died in the epidemic and most children who suffered paralysis were above 1946 average height and/or weight. Possibly the higher incidence of tonsillectomy among taller children is at least partially responsible for a higher incidence of poliomyelitis among the faster growers, while stressful living factors as they slow child growth also lower immunity.

Summary

1. The heights and weights of Saskatoon public school children in 1936, 1946 and 1956 are given, together with a description of the techniques and methods used.

2. While 1956 children, except for 7-, 8-, and 9-year-old boys and 7- and 8-year-old girls, are taller than those of 1936 and 1946, and heavier than in former years, little difference in height or weight occurred between 1936 and 1946.

3. Although socio-economic conditions improved very appreciably between 1936 and 1946 and were relatively unchanged between 1946 and 1956, increase in the growing speed of our children occurred only after 1946. Among 1956 children, upper socio-economic group children were taller and heavier than others.

4. The faster growth in height and weight in 1956 was accompanied by greater mental age on testing and by an earlier age at which the normally expected increase in the loss of visual acuity occurred, and probably by an accompanying advance to an earlier age on the onset of puberty.

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A Rapid Method for Estimating the Bacterial Count of BCG Vaccine

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ONE of the greatest problems associated with BCG vaccination is the short life of BCG vaccine when used in the fluid form. The viable organisms decrease rapidly in number, even when stored under proper conditions, limiting the effectiveness of the vaccine to an expiration time of from 10–14 days. Since the efficacy of BCG vaccine depends on the viability of the bacteria in the vaccine, a number of workers have developed a rapid method for the determination of the viability of the vaccine based on the reduction of tetrazolium salts by BCG bacilli. The reduced tetrazolium precipitated inside the living bacterial cell as formazan is extracted and the optical density determined. It was considered that in modifying this technique by introducing microscopical examination of the BCG bacilli stained with tetrazolium, not only the number of living bacteria might be estimated in a very short time, but that it might also be possible to gain some information on the physiological state of the bacilli from the intensity of reduction of tetrazolium dye by individual cells.

Materials and Methods

Materials

Medium: Sauton liquid medium	500 ml.
Phosphate buffer M/2 (pH 7.15)	100 ml.
Distilled water	400 ml.

Sterilized at 10 lb. for 30 minutes, cooled and then dried human serum[1] added to give a final volume of 5% of serum.

Tetrazolium: A 1% solution of neotetrazolium chloride[2] was dissolved by autoclaving at 10 lb. for 10 minutes. This was allowed to cool and then centrifuged at 2,000 r.p.m. for 20 minutes. The supernate was then autoclaved at 15 lb. for 15 minutes.

Picric acid: (Mallinckrodt–U.S.P.)–Saturated solution at room temperature.

Plate counts: Colony counts were made on oleic-acid albumin agar (1) and on Lowenstein-Jensen medium.

Counting chamber: A 6 mm. stainless steel cup[3] (stored in a 1:1 alcohol-ether solution) was mounted on a microscope slide with a fine film of bovine albumin solution. This was then dried at room temperature and fixed by flaming.

Technique

1. *Staining of the living bacilli*: 15 mg. of BGC vaccine calculated from the weight of the vaccine, as shown by the manufacturer on the label, were inoculated into 4.5 ml. of Sauton medium in a 150 × 18 mm. test tube. The vaccine was incubated for 24 hours at 37° C. and then 0.25 ml. of 1% solution of neotetrazolium chloride was added and incubated at the same temperature for a further 48 hours. The BCG suspension in the medium was then diluted 1:50 in Erlenmeyer flasks containing stainless steel balls 4 mm. in diameter. The diluted material was shaken gently and 0.1 ml. placed in the previously prepared cup and dried in the incubator at 56° C. for several hours. After drying, the cup

1, 2, 3 Biologics Control Laboratories, Laboratory of Hygiene, Department of National Health and Welfare, Ottawa.

was removed and the preparation fixed by flaming. A thin layer of immersion oil was placed on the slide and the bacteria in the preparation were counted under an oil immersion objective using an ocular micrometer placed in the eyepiece. The micrometer divided into 100 small squares was previously calibrated against a stage micrometer. By calculation, it was determined that there were 2,827 fields in the internal cup area. For each determination 100 fields were counted. The number of bacteria was calculated using the following formula:

$$\frac{\textit{Number of bacteria} \times 2827 \times 10{,}000\ (\textit{dil. factor})}{\textit{Number of fields}\ (100)}$$

The BCG organisms appeared as purple-red bacilli and were present on the slide singly and in clumps of from 5 to more than 100 bacilli. Both single cell and clump counts were carried out. In making individual cell counts, wherever possible, each organism in a clump was counted. When this was not possible because of the density of the bacteria in the clump, a count of 50 was arbitrarily assigned to each 100 square microns.

2. *Counterstaining of dead bacilli*: to determine the ratio of living to dead organisms, the following procedure was followed: 4.5 ml. of Sauton medium were inoculated with 15 mg. of BCG vaccine. After 24 hours at 37° C., 0.25 ml. of neotetrazolium chloride solution was added and the tube was incubated for 48 hours at 37° C. The suspension was centrifuged at 2,000 r.p.m. for 15 minutes and the supernate discarded because the albumin interferes with the counterstaining. To the centrifuged cells 0.5–1.0 ml. of picric acid was added, and mixed well. The bacilli were washed in 15 ml. of distilled water, centrifuged, the supernate drawn off and resuspended in 2 ml. of distilled water. This was poured onto a microscope slide, dried, fixed in the flame, covered with immersion oil and examined under the microscope. The dead cells were stained yellow while the living cells were purplish-red.

[1]Hyland Laboratories, Los Angeles, Calif.
[2]General Biochemicals, Inc., Chagrin Falls, Ohio.
[3]The Ericson Screw Machine Product Co., Inc., Brooklyn, N.Y.

Results

To establish the reproducibility of the method, 12 BCG vaccines were assayed in triplicate and the coefficient of variation estimated. Table I shows that the coefficient of variation ranged between 0.6 and 7.8% with a mean value of 3.4%.

The difference between plate colony counts on Lowenstein-Jensen medium and the slide counts performed with our method was assessed in 9 vaccines. Table II shows that with vaccines 1 to 6 where large clumps were present, plate counts gave a value considerably smaller than the slide counts but close to the clump count, as would be expected, since only a single colony would arise from a clump of organisms in the plating method.

Discussion

Since the efficacy of BCG vaccine depends on the viability of the cells in the vaccine, and since this viability is only of very short duration, there has been a great need for a rapid method for counting the number of living organisms in the fluid vaccine. De Goes *et al.* (2) used the reduction of tetrazolium salts by BCG bacilli, followed by extraction of the reduced tetrazolium precipitated inside the bacterial cell as formazan. Estimation of the optical density of formazan solution was then used to assess the viability of batches of BCG vaccine. Attempts in this laboratory to confirm their findings have met with only moderate success because of the weaknesses of the method (2, 3).

TABLE I—Reproducibility of Counting with the Slide Method

Vaccine	Reading in millions of colonies/ml.	Standard deviation (in millions)	Coefficient of variation
1	818.0 803.0 784.5	16.0	2.1%
2	492.5 468.3 449.0	21.84	4.6
3	859.0 956.0 975.0	62.21	6.6
4	770.2 700.0 820.0	60.29	7.8
5	729.6 792.0 762.0	31.20	4.1
6	1,661.0 1,506.0 1,610.0	25.13	1.5
7	531.0 553.0 498.0	27.73	5.2
8	2,246.1 2,000.0 2,908.0	62.26	3.03
9	1,320.0 1,392.0 1,304.0	15.26	1.1
10	1,141.0 1,102.1 1,130.5	20.20	1.7
11	1,141.8 1,287.5 1,075.0	34.36	2.9
12	1,470.0 1,499.0 1,530.0	9.34	0.6

TABLE II—Comparison Between Slide and Plate Counting Methods

Vaccine	Slide method* individual cell count	Slide method* cell and clump count***	Plate count* on Lowenstein-Jensen medium
1	527,330,000	170,000,000	145,000,000
2	469,930,000	162,000,000	113,000,000
3	1,502,900,000	249,000,000	230,000,000
4	763,400,000	285,000,000	320,000,000
5	907,800,000	323,000,000	290,000,000 ;
6	745,800,000	354,000,000	400,000,000
7**	2,202,586		1,280,000
8**	1,425,722		900,000
9**	1,622,145		1,115,000

* Average of 3 counts.
** Lyophilized vaccine
*** Each clump given a count of 1

The method described in this paper is based on the microscopical examination of the BCG bacilli stained with neotetrazolium chloride under controlled experimental conditions. On Sauton's medium, it is almost universally accepted that there is little, if any, multiplication of BCG in 24 hours at 37° C.; con-

sequently the initial incubation of the vaccine used in the recommended staining procedures should not in any material way affect the reliability of the count. The subsequent incubation, moreover, would in no way increase the count because the added neotetrazolium in the concentration used inhibits multiplication. The medium with buffer and human serum favours a strong vital staining. With this medium the formazan precipitated inside the bacterial cell is not easily extractable with various solvents. In the method described, 0.25 ml. of 1% tetrazolium solution was used for 15 mg. of vaccine. If, however, the quantity of vaccine is considerably less or more than 15 mg., appropriate modifications should be made in the amount of tetrazolium used.

The method is rapid since it makes possible the counting of living organisms within 72 hours and is reproducible because its coefficient of variation is exceptionally low (3.4%) as shown by assays made on 12 vaccines in triplicate; it is suitable for an accurate count because staining does not require any mordant, counterstaining and washing of the slide with subsequent loss of bacteria.

The counterstaining described in this paper gives only a superficial greenish colour to the dead bacteria and is not part of the routine method of counting; it is performed only as a control since it gives an immediate and clear idea of the relationship between dead and living bacilli.

The comparison between plate and slide counting methods reveals the fact that where large clumps are present in a vaccine the plate count gives a value considerably smaller than the slide count but close to the clump count, since only a single colony would arise from a clump of organisms in the plating method.

In conclusion it can be stated that with this method not only the number of living organisms may be estimated in a short time but it might also reveal some information on the physiological state of the bacilli from the intensity of reduction of tetrazolium dye by individual cells, the more intense the staining the more physiologically active the cell. This is important because as shown by Dubos (4) aside from the viability of the bacteria the physiological state must be considered for in its preparation the vaccine is exposed to a number of physical and chemical traumas. Thus, each vaccine consists of an unpredictable mixture of cells possessing all the degrees of physiological age and activity.

Summary

A method is described whereby living bacilli of BCG vaccine may be counted in 72 hours. The method, which shows a mean coefficient of variation of 3.4% for 12 BCG vaccines assayed, is based on reduction of neotetrazolium chloride by living bacteria under controlled experimental conditions followed by microscopical examination of the stained bacilli. A counterstaining may be performed—as a control—using picric acid and methyl green.

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Sanitation of Soft-Drink Bottling Plants[1]

W. F. NOYES,[2] C.S.I.(C)

THE ingredients of a carbonated beverage are a sugar syrup to which is added a small amount of suitable acid and flavouring. This mixture is blended and a measured amount drawn into a glass bottle and the bottle filled with purified water that has been carbonated, i.e., saturated with carbon dioxide gas. It is necessary to have adequate storage facilities for the sugar syrup, extracts, and other edible materials required in the process. Good public health practice dictates that these products must be stored in a dry, clean, well-lighted room provided with adequate racks and shelves. No inedible materials should be stored in this room. Proper floor drainage is a necessity and wall surfaces should be smooth to afford easy cleaning. Ventilation is desired to prevent mould growth or other spoilage.

Water Treatment

Suspended Matter

The water used in the manufacture of bottled soft drinks must always be obtained from a supply which has been approved by local health authorities as a source of drinking water and must be of unquestionable sanitary quality. Water that is approved for drinking is not always suitable for use in soft drinks. In order to obtain a beverage with a uniform flavour and a high quality it is necessary to have water of better quality than is normally available. Water is generally treated to improve its appearance, taste and odour and to remove certain minerals and salts which are present in some localities.

There are several water treatment processes in use because the sanitary, physical and chemical characteristics of water vary considerably in different sections of the country. Water drawn from rivers, lakes, springs or deep wells in the same geographical area may differ in these respects and may require several different methods of treatment.

There are few natural waters that do not contain at least a small amount of suspended matter that may not be visible to the eye. Clarification is usually achieved by use of a pressure sand and gravel filter. Waters containing only very minute amounts of suspended matter may be filtered through sheets of papers or other fibrous materials. The paper or fibre sheets are supported in a frame to allow passage of the water and the rate of flow is carefully controlled. The degree of clarification accomplished by this method depends on the fineness and composition of the filter sheets. This type of filter is commonly called a "polisher" and is also frequently used after sand and gravel filtration. Sometimes it is necessary to accomplish clarification by coagulation brought about by the addition of such chemicals as alum, sodium aluminate or ferrous sulphate.

[1]Presented at the Seventh Annual Institute for Sanitary Inspectors held at the University of Manitoba, Winnipeg, March 4–8, 1957.

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Removal of Tastes and Odours

Filtration and coagulation processes will generally remove from the water undesirable biological growth and some industrial waste products. For the removal of foreign tastes and odours and especially free chlorine, the use of a contact filter of activated carbon in an enclosed pressure tank is the method of choice. The carbon is used until its absorptive capacity is depleted. The average life of the carbon is from six months to a year. The amount of acidity or alkalinity desired by the particular product will dictate the pH of the treated water.

Chlorination is the most common method used to ensure bacteriological sterility of the water after filtration. This is, of course, followed by a method of dechlorination. Ozonation is employed in some bottling plants for the bacteriological treatment of the water and is also effective in the destruction of tastes and odours. Ozone is produced by using a high voltage electric field.

Carbonation

Carbonation has been defined as dissolving carbon dioxide gas in water under conditions of favourable temperature and moderate pressure. Liquid carbon dioxide is fed into the carbonator and the gas absorbed by the water under a controlled pressure. The extent of carbonation desirable depends on the type and flavour of the beverage and the manner in which it is to be used.

The amount of carbon dioxide gas forced into water is expressed as volumes. One volume is the amount of gas that a given quantity of water will absorb at atmospheric pressure and a temperature of 60° F. These two arbitrary points have been set by agreement in order to establish a starting point in the standard measuring system.

Water will absorb more gas as the temperature decreases or as the pressure increases. The gauge used in measuring pressures does not show atmospheric pressure. The "zero" on the gauge is actually atmospheric pressure (approximately 15 lb. per square inch at sea level). At 60° F. water will absorb one volume of gas at "zero" on the pressure gauge. At a temperature of 60° F. and 15 lb. pressure, water will absorb 2 volumes of gas. For each additional 15 lb. increase in pressure of water at 60° F., an additional volume of gas may be absorbed by the water. As the temperature of the water decreases so the absorptive capacity increases. At 32° F. each additional 15 lb. increase in pressure gives an additional 1.7 volumes of gas as against 1 volume at 60° F.

Since the carbonation of a beverage gives it sparkle and life, maintenance of the correct volume of gas is important for the purpose of bringing out the flavour. A well-carbonated beverage should contain 3 to 4½ volumes when bottled, depending upon the type of beverage. By frequent determination of the actual gas content of the finished bottled beverage it is possible to regulate pressures and detect defective capping.

Syrup Making

In making of sugar syrup, only high quality sugars are used. By dissolving the sugar in purified water, simple syrup is obtained containing from 5 to 6.3 pounds of sugar per gallon. Flavouring substances are added to this simple syrup. These substances are often alcoholic extracts, water solutions or

emulsions made from the aromatic portions of many roots, barks, herbs, or berries. Natural fruit juices are also used for flavouring as are special chemical mixtures, known as artificial flavours. The resulting flavour syrup mixtures are made more palatable by the addition of edible acids, principally citric acid or its prototype made by fermentation of molasses. Additional colour is often added in the form of caramel or certified food colouring materials.

Bottling Operations

It is the opinion of the writer that the most significant advances have been made in bottling plant equipment and in plant design. Equipment is described as the procedure of the plant is outlined.

Empty Bottle Uncaser

A machine for uncasing bottles is in use that requires the minimum of attention. The machine is manufactured to the specifications of a particular bottling plant and can handle any size of bottle from 6 oz. to 1 qt. The change-over from one bottle size to another takes approximately 15 minutes. Cases of empty bottles, all of the same type and size, whether in 12-, 24- or 6-bottle carriers packed 4 to a case, are fed into the machine. Cases may contain debris and refuse accumulated since the last trip from the plant to the store, to the home, back to the store, and eventually back to the plant. Cases of all sizes can be automatically cleaned by an electrically driven case cleaner. The case is held in a reel in an inverted position and given a thorough blasting from air nozzles fed by 60 lb. of pressure. While still in the inverted position the case is given a vigorous shaking and another blast with air and then the reel returns to the upright position.

Bottle Washing

In the past it was the accepted practice for bottle washing machines to be hand fed which often resulted in washing machines being operated at less than peak performance. Today, the empty bottles come from the uncaser via a conveyor to a machine which arranges them in an orderly fashion and loads them into the washing machine.

Improvements in the bottle washer itself have been numerous. Briefly, some of the points worthy of note are: improved carriers, horizontal pre-rinse, increased number of caustic tanks, provision of tanks for special cleaners, exterior and interior brushing of bottles with safety ejector switches and increased final rinse. Although the retention periods and strength of caustic solution are stipulated in health act regulations it is safe to assume that the present-day washers exceed these requirements.

Bottle Filling

Two filling methods are in general use. The more common method is the addition of a measured amount of syrup to the bottle which is then filled with carbonated water. This method requires facilities for spinning the bottle to mix the syrup and water thoroughly. The second method provides for the proper amounts of syrup and water being automatically measured by a continuous metering system then mixed, cooled and carbonated simultaneously by forcing them through a special type of carbonator.

Following either method, the bottles are capped and have an internal pressure of 20 to 40 pounds per square inch. The pressure may reach as high as 100 pounds per square inch when subjected to direct sunlight in the summer.

Detection of Faulty Capping

An electronic machine has now been designed and put into operation that automatically detects faulty crowning operations and subsequently shuts off operations to afford early rectification of the stoppage.

Finished Product Inspection

A recent development at this stage of bottling plant operation is most noteworthy. It was appreciated by a world-wide manufacturer of electronic devices that the electric eye could perform superior and untiring inspection of bottled beverages. The bottle is clamped automatically in a rotary turret. It is spun, causing all material and liquid inside the bottle to spin. The spinning is stopped abruptly allowing the liquid and any foreign particles to rotate. An exciter light directs its beam through the spinning contents upon phototubes. If any foreign particles are present the change in light falling upon the phototubes produces an electrical impulse which is then amplified. An amplified signal causes the position of the bottle in the turret to be registered on a memory device. The memory device causes the bottle to be ejected automatically when the turret containing the bottle reaches the rejection point.

This machine is capable of processing 150 bottles per minute and can detect foreign particles, low fills, bottles containing grease, oil or caustic if the amount is sufficient to cause excessive bubbling at the time of inspection.

Storage of Finished Products

The most significant advances have been the "front end" loader and the "pallet" system. Supervisors of bottling plants have been quick to appreciate the time saved by their use. The front end loader is a familiar piece of mobile equipment in many industries and can be used without the pallet. The pallet is a well constructed wooden platform with clearance from the floor which allows the "forks" of the front end loader to go under and in for the lift. The pallet can be designed to carry a desired number of cases and when loaded they can be placed either in storage or directly in the truck in preparation for delivery. It is possible to stack the platforms to reasonable heights to provide maximum use of storage space.

Summary

Provincial regulations have set minimum standards and the bottling industry has appreciated that compliance with these regulations improves the product, plant operation and the welfare of employees. Today, the industry voluntarily exceeds these minimum standards and using the modern equipment described, provides safe, desirable carbonated beverages in large quantity with a minimum of effort and at low unit cost.

ABSTRACTS OF PAPERS PRESENTED AT THE TWENTY-FIFTH ANNUAL CHRISTMAS MEETING OF THE LABORATORY SECTION, CANADIAN PUBLIC HEALTH ASSOCIATION, TORONTO, DECEMBER 9 and 10, 1957.

Penicillinase Studies

M. GOLDNER, *Connaught Medical Research Laboratories, Toronto.*

PENICILLIN-RESISTANT strains of staphylococci isolated from clinical cases are considered to be resistant, principally, as a result of their production of penicillinase. Iodometric and spectrophotometric methods of measuring the penicillinase enzyme activity on the penicillin substrate are used. The calculated values of penicillin inactivation generally lie within ± 10 per cent of the found values. The two assay methods give comparable results for penicillin inactivation in relation to time. In penicillinase activity determinations on penicillin-resistant bacterial growth cultures, no penicillinase was detected in the staphylococcal supernatants examined. Growth of such strains of staphylococci with and without penicillin revealed that the presence of penicillin increased the penicillinase production. Cultures of penicillin-resistant staphylococci, isolated from various clinical sources in Canada, were grown in the presence of penicillin, and penicillinase activities determined by the iodometric method after 15 minutes incubation. This provided a means of screening staphylococcal strains for selection of penicillinase-producers suitable for further study. We have made use of this in relation to our work now in progress on the purification and inhibition of staphylococcal penicillinase. With sensitive methods of penicillin assay, such as the microbiological plate diffusion method, it would be possible to determine penicillinase activity at substrate levels approaching the concentrations found after penicillin therapy.

The Effect of Penicillin on the Structure of the Cell Wall of *Micrococcus pyogenes*.

R. G. E. MURRAY, W. H. FRANCOMBE and B. H. MAYALL, *Department of Bacteriology and Immunology, University of Western Ontario, London.*

IT HAS been postulated that the selective toxicity of penicillin is due to interference with the synthetic pathway to an unique component of the cell walls of certain bacteria. The evidence for this view has been summarized by Park and Strominger (Science **125**: 99–101, 1957) and the chemistry of cell walls has been reviewed by Work (Nature, **179**: 841–847, 1957).

We have exposed sensitive strains of *M. pyogenes* to large and small doses of penicillin. The cultures, with comparable untreated controls, were fixed 1–5 hours later, embedded in methacrylate for sectioning and electron microscopy. The contrast of the cell walls was increased by cutting the sections onto a 1% solution of Lanthanum nitrate.

Many of the cells, especially after longer exposure, were much larger than normal but, in all cases the main "lesions" appeared in the cell wall. The developing cell wall septa were strikingly deformed, irregular and thickened. The peripheral cell wall was, in nearly all cases, measurably thinner than the walls of control cells. There were minor but definite irregularities of the inner table of the cell wall, which might involve the cytoplasmic membrane. These observations suggest that regions of the most active synthesis of cell wall material (e.g. cell wall septa) are the most severely involved and to that extent support the biochemical hypothesis.

Resistant strains, including a derivative of a sensitive strain used in the foregoing experiment, also showed some of the above signs of poisoning but they were able to recover their normal structure.

Epidemiological Investigations on Ringworm in Eastern Quebec (Gaspe).

F. BLANK, *Department of Bacteriology and Immunology, McGill University, Montreal.*

FIELD INVESTIGATIONS have shown that, besides sporadic epidemics of animal microsporosis (*Microsporum canis*), endothrix infections (*Trichophyton tonsurans, T. epilans, T. sulfureum*)

and human favus (*T. schoenleini*) occur not infrequently in different parts of the Gaspe peninsula.

The Use of Tube and Plate Agglutination Tests in the Diagnosis of Leptospirosis in Cattle.

PAUL BOULANGER, *Animal Diseases Research Institute, Hull.*

WE HAVE previously shown by means of complement-fixation and agglutination-lysis tests that infection with *Leptospira pomona* is fairly widespread among cattle in Central Canada. Both of these serological methods, however, involve complex and time-consuming procedures which tend to confine their use to specialized laboratories. There is an obvious need for simpler techniques so that leptospirosis may be diagnosed in the smaller laboratory. Studies were, therefore, undertaken of the value of the simpler tube and plate agglutination tests with formalized antigens. The results obtained with these two methods in clinically infected herds showed close agreement with those obtained in agglutination-lysis tests. As is the case with all serological tests for leptospirosis, the results should always be evaluated in relation to the clinical history of the herd and the individual animal.

A Human Outbreak of Psittacosis Due to Infected Turkeys in a Poultry-Processing Plant.

E. J. BOWMER, *Director, Division of Laboratories, Vancouver.*

IN A POULTRY processing plant in British Columbia 24 of the 34 employees were stricken within a few days by an illness characterized by high fever, cough, prostration and lung signs. A tentative diagnosis of psittacosis was made on epidemiological and clinical grounds.

Epidemiological investigations carried out by representatives of the Federal and Provincial Department of Agriculture disclosed that consignments of turkeys had been sent in from one farm on which the sole surviving turkey, a tom, was shown to have an indirect complement-fixation titre against the psittacosis antigen of 1/25 which is considered significant.

Serological studies of the 34 employees demonstrated that the majority of those with symptoms showed a suggestive or diagnostic rise in antibody titre between an acute phase serum and one taken during convalescence. In some of the cases prompt administration of antibiotics had undoubtedly interfered with the antibody response.

A study of the relationship between infection and place of employment in the plant indicated that those who were most closely associated with the turkeys contracted the infection whereas the outside and office workers escaped infection.

The eviscerator at a department store which had received New York dressed birds from the plant was afflicted with a serious illness clinically resembling psittacosis. Attempts at virus isolation were negative but there was strong serological evidence of infection.

Experiments on the Reduction of the H-Antigenicity of Motile *E. Coli* Strains for the Production of OB Diagnostic Antisera.

A. E. KELEN, *Division of Laboratories, Ontario Department of Health, Toronto.*

USING MOTILE *E. coli* strains for which non-motile strains are unavailable, experiments have been carried out on the reduction of H-antigenicity for the purpose of producing OB diagnostic antisera.

One of the methods consisted of cultivating the strains on solid media containing 0.1% phenol, with subsequent selection and transfer of colonies which revealed reduced motility. In a second method, the strains were cultivated in liquid or semi-solid medium containing homologous H-antibodies. From non-H-agglutinable variants produced by both methods, antigens have been prepared.

Immune rabbit sera have been obtained possessing no demonstrable amounts of H-antibodies, fairly good B titres, and insignificant O titres when tested with living cultures. Thus the characteristics of the sera fully correspond to the requirements of *E. coli* OB diagnostic antisera.

Tissue Culture Methods in the Study of Infections caused by the Herpes Simplex–Varicella Group of Viruses.

MAIRAN CLARKE, FRANCES W. DOANE, NORMA DAVIS, R. M. EHRLICH, and J. A. TURNER. *The Hospital for Sick Children, Toronto.*

AN ELEVEN-DAY old infant was admitted to the Hospital for Sick Children, Toronto, with a confluent rash of chickenpox, and died seven hours later. Portions of skin, lung and brain were investigated by tissue culture techniques and a virus causing changes characterized by intranuclear (Lipschütz) inclusions, and giant cell formation was isolated from skin and lung by inoculation of human amnion cultures. This virus appears to be varicella. Tissue culture methods are discussed in relation to the diagnosis of the herpes-varicella group of infections.

Antibiotics and Sanitation in Relation to the Microbiology and Preservation of Poultry Meat.

G. W. ANDERSON, D. A. SILVESTRINI and E. S. SNYDER, *Department of Bacteriology, Ontario Agricultural College, Guelph.*

THE EFFECT of 10 p.p.m. of either chlortetracycline HCl (aureomycin) or oxytetracycline HCl (terramycin) to the water of the chill-tanks used during the processing as a means of prolonging the storage life of poultry meat, was studied under laboratory and field conditions. These conditions were indicative of varying degrees of sanitation. Birds from the different sources were stored at 40°F. and representative samples removed for testing at intervals during the storage period of 25 days.

Organoleptic examination indicated that both chlortetracycline HCl and oxytetracycline HCl added to the water in the chill-tanks delayed the onset of "off-odours" and increased the storage life of the meat in all tests. In these tests 10 p.p.m. of chlortetracycline HCl proved to be more effective than oxytetracycline HCl in prolonging the storage life. However the efficacy of both antibiotics was greatly affected by the initial load of micro-organisms deposited on the meat by the varying sanitary measures employed. Spoilage as indicated by organoleptic tests was closely associated with the increase in microbial population, the degradation of tissue protein and the reduction in the residual antibiotic detected in the various tissues of poultry meat.

Chemotherapy of Experimental Tuberculosis with Hydrazone 377.

C. O. SIEBENMANN and C. BARBARA, *Connaught Medical Research Laboratories, Toronto.*

AS A RESULT of a search for synthetic therapeutic agents for the treatment of human tuberculosis (Zubrys and Siebenmann, Canad. J. Chemistry, **33**: 11, 1955) Compound 377 was selected for clinical trials on account of its marked antituberculous activity in the delayed treatment of experimental tuberculosis in mice and in guinea pigs. As the isonicotinylhydrazone of 2-formyl-phenoxy-acetic acid, Compound 377 is as effective as isoniazid when given in equimolecular dosage. Its much lower toxicity in animals, as compared to isoniazid, indicates the possibility of using Compound 377 in larger doses without the risk of encountering neurotoxicity.

Compound 377 forms a water-soluble sodium salt which is therapeutically effective when administered to mice by parenteral route.

Fed to mice, Compound 377 is eliminated in the urine partly unchanged, partly as free isoniazid. The drug shows a characteristic maximum absorption in the near-ultraviolet region (340 mμ) which distinguishes it from isoniazid, acetyl-isoniazid and PAS.

In Vitro Inhibition of Streptomycin Activity on *M. tuberculosis* H 37 Rv.

O. MORGANTE, *Alexandra Hospital and McGill University, Montreal.*

MANY SUBSTANCES have been tested to inactivate *in vitro* the action of streptomycin on sensitive tubercle bacilli, grown in Kirchner's medium. Of all the substances tested, only semi-carbazide HCKm at the concentration of 80 gamma per ml., has proved to be effective in the inactivation of 5 gamma per ml. of streptomycin. Neither eighty gamma per ml. of semi-carbazide HCl alone, nor semi-carbazide HCl in any of its combination were inhibitory for tubercle bacilli, H 37 Rv strain.

Antigenic Relationships of Acid-fast Bacteria, Including Chromogenic Strains.

E. MANKIEWICZ, *Royal Edward Laurentian Hospital and McGill University, Montreal.*

CHROMOGENIC ACID-FAST bacilli isolated from apparently healthy persons, or from patients with active tuberculosis, cannot be classified as either tubercle bacilli or saprophytic acid-fast bacilli according to their cultural characteristics, their biochemical properties, their susceptibility to antibiotics, or their virulence for laboratory animals. The formation of pigment in relation to the presence or absence of light did not give any clue as to their true nature.

The antigenic properties of some 40 of these acid-fast chromogenic strains were studied by means of (1) The agar diffusion precipitation technique (Oudin, modified Ouchterlony) and (2) Complement fixation technique ("Cold method" technique, C. Rice). In both techniques, cells, culture filtrates and cell extracts were employed. The latter technique with lipid extracts from the bacteria as antigens gave the more promising results as some chromogenic strains could be linked antigenically with virulent tubercle bacilli, whereas others fell in with the group of saprophytic micro-organisms.

The Effect of Combinations of Streptomycin and Chloramphenicol on *Eschericia coli*.

N. A. HINTON and J. H. ORR, *Queen's University, Kingston.*

THE DIFFICULTIES inherent in the evaluation of the combined activity of two antibiotics are emphasized by this work. Addition, indifference, antagonism and the prevention of the emergence of a resistant mutant are all shown to be demonstrable with this single system by the suitable manipulation of the drug concentrations, the size of inoculum, the nature of the medium and the time of observation.

Evidence is presented to show that the antagonism of Chloramphenicol for the early bactericidal effect of streptomycin is a particular attribute of the former drug and cannot be explained as being due to bacteriostasis per se.

Aseptic Meningitis in Manitoba in 1957.

J. C. WILT, *Department of Bacteriology and Immunology, University of Manitoba, Winnipeg.*

THIRTY CHILDREN with aseptic meningitis were investigated during August and September. Samples from these patients included throat swabs, spinal fluid, faeces, and paired blood specimens. Eleven identifications of ECHO Type 6 were made and two of ECHO Type 9. Four isolations were made from cerebrospinal fluid and the remainder from faeces.

The Enterobacterial Hemagglutination Test as a Tool for Etiologic Diagnosis of Intestinal Infections.

ERWIN NETER, *Children's Hospital and Departments of Bacteriology and Pediatrics, University of Buffalo, School of Medicine, Buffalo, N. Y.*

STUDIES FROM this and other laboratories have revealed that the enterobacterial hemagglutination test is considerably more sensitive than the conventional agglutination method for the demonstration of the antibody response of patients with infections due to salmonellae, shigellae, and enteropathogenic *Escherichia coli*. This test has been utilized for the clarification of the etiologic role of suspect enteric pathogens. In a household outbreak of diarrheal disease associated with paracolobactrum (*Escherichia coli* 075) high titers or substantial increase in titers of homologous hemagglutinins were demonstrated in four cases. No parallel changes occurred in the titers of antibodies to four unrelated enteric pathogens. Illustrative examples will be presented on the detection of subclinical infection in household associates of patients with clinical salmonellosis and shigellosis by means of the enterobacterial hemagglutination test. The potential usefulness of the method as an adjunct tool for etiologic diagnosis of clinical and subclinical enteric infections will be discussed.

Report on the Isolation of Toxoplasma from Mink.

J. T. PRIDHAM, *Department of Pathology and Bacteriology, Ontario Veterinary College, Guelph.*

DURING THE period December 1956 to September 1957 toxoplasmosis was recognized on four mink ranches in Ontario. The diagnosis was made first by histopathological examination of sections of brain and verified by serological tests and the isolation of the organism in mice. Toxoplasmas were observed in the brain, liver, intestines, pancreas and lung sections of affected animals. Mortality has ranged up to 90 per cent.

The Detection of a Typhoid Carrier by the Use of Gauze Swabs.

E. J. BOWMER, *Director, Division of Laboratories, Vancouver.*

BETWEEN 1953 and 1957 four sporadic and apparently unconnected cases of typhoid fever occurred at yearly intervals in a municipal area dependent on septic tank sewage disposal.

The only common factors were:

1. The four cases were all caused by phage-type E_8.
2. All were boys aged 8–12 attending the same school and having access to the same stream fed by storm-water drains.

Gauze swabs were placed in the storm-water drain and *S. typhi* phage-type E_8 isolated. After a series of swabs had been examined from closed and open drains above the stream the field for search was narrowed to 3 houses. From one septic tank *S. typhi* phage-type E_8 was isolated and from stools of one woman phage-type E_1 was recovered. Subsequent stool cultures from the carrier consistently showed only type E_8. It appears that *S. typhi* phage-types E_1 and E_8 may be related in a manner similar to F_1 and F_2 (Anderson 1951). It appears that the stream was contaminated with *S. typhi* by the overflow into storm-water drains of a faulty tile bed associated with a septic tank in the carrier's home.

Typing of Cultures of S. Typhi from a Carrier Harbouring Types E_1 and E_8.

J. M. DESRANLEAU and IRENE MARTIN, *Ministry of Health, Montreal.*

AN INTENSIVE, systematic examination, by means of bacteriophage typing, was made of a large number of cultures of Salmonella typhi to determine the relationship, if any, between a carrier, Mrs. P., and sporadic cases of typhoid fever in a British Columbia area; the first culture from the carrier was of Type E_1 whereas cultures from cases suspected of having been infected by Mrs. P. were Type E_8.

In 1954 and 1955 two strains of *S. typhi* from the area concerned were found by us to be of Type 31 (Wilson and Edwards); this type was later classified as Type E_8 by the International Committee on Phage Typing of the Enterobacteriaceae. In 1956 and 1957, we found culture from 2 other cases to be of Type E_8.

A culture from the sewage considered as a possible source of infection of the four sporadic cases proved to be of Type E_8. Of 12 further cultures from the sewage, 8 were of Type E_8, 3 of Type E_1, and 1 was a mixture of Types E_8 and E_1. At the same time a culture from a suspected carrier, Mrs. P., was found to be of Type E_1. A culture from her "septic tank" was of Type E_8. A second strain from Mrs. P. was found to be of Type E_8.

From 5 samples of feces from Mrs. P. we isolated 252 cultures; 26 (10 per cent) were of Type E_1 and 226 (90 per cent) of Type E_8. In a series of 37 cultures from Mrs. P. and sewage, 75.6 per cent were of Type E_8 and 21.6 per cent Type E_1.

A further 242 strains from the bile and the gall bladder of Mrs. P., tentatively typed by screening tests with phages E_1 and E_8, were submitted to us for confirmation and complete typing; the study of these is under way.

A systematic search for symbiotic phage in all cultures failed to reveal the presence of such agent.

Experimentation is being undertaken to attempt transformation *in vitro* of phage Type E_8 strains to Type E_1 or *vice versa*.

A total of 538 cultures have been examined to date in an effort to elucidate this interesting problem.

Chemical Analysis of the Lipids of Five Substrains of *Mycobacterium tuberculosis var. BCG.*

VINCENT PORTELANCE, *Institute of Microbiology and Hygiene, Montreal.*

A CHEMICAL ANALYSIS of the free lipids of five substrains of BCG was performed. In order to avoid any differences that may be brought about by cultural conditions, the five substrains were submitted to the same cultural cycle prior to analysis.

Quantitative variations in the total free lipid content of the five substrains were observed. Marked differences were also found to exist in the relative concentrations of several lipid fractions studied. The chemical analysis of these lipid fractions revealed that qualitative differences could also be found between the five substrains studied.

Staphylococcal Infections and Antibiotic Therapy—A Four Year Study in One Hospital—Development of Resistance Correlated with Prevalence of Use of Five Antibiotics.

D. H. STARKEY, *Queen Mary Veterans Hospital, Montreal.*

THIS FOUR year study of the over-all usage of five antibiotics coupled with the percentages of strains of *Staphylococcus pyogenes* (*aureus*) showing resistance or sensitivity to each antibiotic in quarterly periods over 4 years, reveals the usual trends of increasing resistance with increased usage. The marked differences in speed of adaptation of the staphylococci to the different antibiotics are demonstrated and the implications of the findings in respect to policy in the use of different antibiotics are discussed.

A further break-down of the strains studied by source, using clinical and 'phage typing evidence for dividing strains according to whether or not the patients' infection appears to have been acquired in hospital or outside, indicates that difficulties in therapeutic application of antibiotics arise largely from hospital strains and not from those acquired outside.

THE 1957 ALBERT LASKER AWARDS

The year 1957 marks the twelfth annual presentation of Albert Lasker Awards by the American Public Health Association. The Lasker Awards are given by the Albert and Mary Lasker Foundation to individuals and groups for outstanding contributions in research related to diseases which are the main causes of death and disability, and for distinguished service in the field of public health administration. The Albert Lasker awards have come to be regarded among the nation's primary medical honours. The roster of 1957 Albert Lasker award winners was enlarged by the announcement of an award to the late executive secretary of the American Public Health Association, Dr. Reginald M. Atwater, who died in October after 22 years as Association director. The awards committee said "No man has done more for the public health profession than has Reginald Atwater." In addition to the award for Dr. Atwater, the Association presented the Award for outstanding medical research and public health achievement to nine physicians from the United States, Canada, India and France. Six of the winners were cited for their history-making introduction of the first tranquillizing drugs for the treatment of mental illness. These included Dr. Rustom Jal Vakil of Bombay, India; Dr. Nathan S. Kline, Orangeburg, New York; Dr. Robert H. Noce, California; Dr. Henri Laborit, Paris, France; Dr. Pierre Deniker, Paris, France; Dr. Heinz E. Lehmann, Montreal. Awards were also made to Dr. Richard E. Shope, New York; Dr. Frank G. Boudreau, New York and Dr. C. J. Van Slyke, Bethesda, Maryland. The presentations were made by Dr. Herman Hilleboe, chairman of the Lasker Awards Committee at the second general session of the eighty-fifth annual meeting of the American Public Health Association held in Cleveland, Ohio, November 11–15, 1957.

Canadian Journal of Public Health

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THE ONTARIO HOSPITAL INSURANCE PLAN

Ontario has announced the details of the hospital insurance plan which will come into effect on January 1, 1959. A statement outlining the program was made by the Ontario Hospital Services Commission in October. The plan will provide for more comprehensive hospital insurance benefits than are at present available under Blue Cross or any other private plan. In-patient hospital services are provided with accommodation at the standard or public ward level, necessary nursing services (excluding private duty nursing), laboratory, radiology and other diagnostic procedures together with drugs and use of operating room facilities. The plan provides for use of radiotherapy facilities for the treatment of cancer, physiotherapy facilities and other services rendered by persons who receive remuneration from the hospital. A major change from the original provisions of the federal plan is care and treatment of tuberculosis and mental patients. The inclusion of these patients in the plan was urged by the participating provinces at a meeting of the provincial health ministers and their deputies in September. In December, the Prime Minister announced at the Dominion-Provincial Conference held in Ottawa the acceptance of this important extension of the provisions. A further important announcement made by him was that the federal government was prepared to implement the plan without waiting for the minimum of six provinces to enact legislation. These revisions of the original plan are of the greatest importance. The share of the costs of the care of tuberculosis and mental patients will be of great assistance to the provinces which have been responsible entirely for these costs. Saskatchewan and British Columbia, both of which have had hospital insurance plans operating for some years, will, therefore, receive support in the next fiscal year without waiting until a minimum of six provinces have passed the necessary legislation or commenced the services.

In the basic federal plan there are no limitations on the length of stay, age or occupation of patients, or exclusions for pre-existing conditions. The benefits will be available in all public hospitals, mental institutions, tuberculosis sanatoria, and approved chronic and convalescent hospitals. Providing the hospital plan premium is paid no deductions will be necessary from old age pensions and old age assistance payments as at present for hospital care

in mental hospitals and tuberculosis sanatoria. In social assistance cases where inability to pay a premium has been established, the province itself will pay the premium.

Initially, in Ontario, it is planned that the program will be compulsory for all employees of firms with fifteen or more employees. These mandatory provisions will be extended to include others of the population as the administrative organization develops. The full benefits of the plan will be available to all others on a voluntary basis at the same rates and every facility to enrol for benefits will be extended to firms with fewer than fifteen employees, to self-employed persons such as farmers, and others.

The total projected cost of the Ontario hospital program in 1959, including care and treatment in mental and tuberculosis hospitals, is about $210,000,000. Of this amount, it is expected that the federal government's contribution will approximate one-third of the aggregate cost while the province's contribution will be nearly two-thirds of the cost. Of the province's share, half will be met by payments out of the consolidated revenue fund and the remaining half will come from premiums. The revenue from premiums will, therefore, be about one-third of the cost of the hospital program. Commencing in January, 1959, the premium rates in Ontario for this comprehensive program will be $2.10 per single person and $4.20 per family per month. The family rate will apply irrespective of the number of dependent children up to and including eighteen years of age. These rates are possible only through the large contributions from general taxation and reflect the basic principle of national hospital insurance.

Six provinces—British Columbia, Alberta, Saskatchewan, Ontario, Prince Edward Island and Newfoundland—have entered into the federal plan. The experience of Saskatchewan and British Columbia in providing hospital services and the plan announced in Ontario will be of great assistance in the consideration of the plan by the other provinces.

DR. JOHN T. PHAIR APPOINTED CONSULTANT

Members of the Association will be very pleased to learn that Premier Leslie M. Frost of Ontario announced in December the appointment of Dr. John T. Phair, retiring Deputy Minister of Health, as Consultant to the Department. This is an expression of appreciation of Dr. Phair's outstanding services in the Department of Health in which he has been a member since 1924, being appointed Deputy Minister in 1945. Last year, the Ontario Medical Association honoured Dr. Phair with life membership, an expression of the high esteem in which the medical profession in Ontario holds him. Dr. Phair's contribution to the Canadian Public Health Association as Honorary General Secretary for twenty-four years is unique in the annals of national voluntary health associations in Canada. The Association again expresses its appreciation of Dr. Phair's great services to public health in Canada and wishes for him many years of health and strength.

Special Articles

Canadian Conference on Nursing, University of Ottawa, November 4-5, 1957

HELEN M. CARPENTER,[1] B.S., M.P.H.

Nursing has increased in content and complexity, but many nurses are prepared in hospital schools in which demands for nursing service take precedence over the educational needs of the students. Schools of nursing are organized as an integral part of hospitals, without separate budgets for the schools, and in many instances without adequate teaching and supervisory staff. Although the ratio of employed nurses to the population is higher than ever before, there continues to be a demand for additional nurses to meet the needs of expanding health services. Hospital administrators pressed with problems of staff shortages, increased costs, and increased service demands, are reluctant to support change in the method of training nurses, as students constitute an important source of nursing service around the clock. The public is concerned about the cost of hospital care, and governments are about to implement a national hospital insurance program at a time when the growth of the population, the demand for hospital beds and the cost of providing facilities and personnel have reached an unprecedented peak.

It is against this background that the Canadian Nurses' Association called the first National Conference on Nursing (1). This was considered urgent, for nurses recognize that, at this point in the development of health services, steps can be taken to strengthen nursing education and nursing service, which will result in the preparation of more and better qualified nurses. They also realize that the need for change may go unrecognized and the pattern of nursing education, with resultant weaknesses in nursing service, may be set for many years.

The purpose of the Conference was to provide an opportunity for leaders in the health professions and interested citizens to explore these problems, the solution of which is fundamental to the implementation of the proposed hospital insurance program. The Conference was patterned after the plan of the Ninth World Health Assembly. It was convened under the able leadership of Mr. Joseph Jeffery, O.B.E., Q.C. Among the conference participants were the deputy ministers of health of the federal and provincial governments, directors of government and voluntary health and welfare services, leaders from the universities and the business world, and representatives from national associations.

At the opening plenary session, three background papers were given on the topic, "Nursing in Canada, Today and Tomorrow—Problem and Challenge". The papers were presented by Dr. F. Burns Roth, Deputy Minister of Public Health, Saskatchewan; Mrs. A. Isobel MacLeod, Director of Nursing and Principal of the School of Nursing, Montreal General Hospital; and Mrs. Rex Eaton, O.B.E., President, National Council of Women of Canada. Following the

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opening session, the participants met in groups arranged to represent a cross-section of all members. Each group was assigned a specific topic and requested to prepare a report. The topics for discussion included: the role of the nurse; utilization of nursing personnel; evaluation of nursing needs; preparation of nurses; financial support for nursing education; relationships of the nursing profession with other health professions, government, and the community; research. At the final plenary session, Miss Helen McArthur, National Director of Nursing Services, Canadian Red Cross Society addressed the Conference; and Miss Dorothy Percy, Chief Nursing Consultant, Department of National Health and Welfare, presented a summary of the group discussions. Highlights of the papers and discussion may be of interest.

"NURSING IN CANADA, TODAY AND TOMORROW—PROBLEM AND CHALLENGE".

Dr. F. Burns Roth—A Hospital Insurance Plan Administrator

Dr. Roth identified some of the fundamental problems associated with nursing. He noted the changes that have taken place in nursing, and pointed out that these may be inapparent or ill-understood by nurses, the associated professions, and the public. One of the fundamental concerns of those interested in the development of nursing should be to secure a better understanding of the exact nature of the change. He emphasized that we need to seek a deeper understanding of the needs of the public in relation to maintenance of health and care during illness and to clarify the role of the nurse in the light of new knowledge. Dr. Roth spoke of the different images people have of the nurse. Should the nurse be primarily concerned with making patients comfortable? Should she stimulate patients to put forth the ultimate effort to regain maximum function? Should the nurse be merely a high grade technician? The nursing profession has made suggestions for better methods of nursing education and nursing service that are not well understood by closely related agencies and professions. He expressed the hope that the conference would result in understanding of the reasons underlying the need for change and of the suggestions brought forward by nurses. He also spoke of the need to study motivation in relation to recruitment of young women, and men, into nursing, and the factors that contribute to satisfaction in nursing as a career.

Mrs. A. Isobel MacLeod—A representative of the nursing profession.

Mrs. MacLeod outlined the scope of nursing: "it is teaching as well as treating; it takes place in schools, industrial plants, offices, hospitals and homes; it serves the healthy as well as the sick; it influences government as well as private citizens". The nurse has three major functions; she channels, she nurtures, she interprets. The nurse is the final pathway through which the health services of the community are conveyed to the citizen and focused in a way which makes them useful to him. She fosters the patient's own physical and psychological resources to fight disease and achieve health. She does this on the physical level through daily hygienic care to maintain optimum functioning of the bodily processes. Emotionally, she supplies and helps the family and others to supply an environment which contains a warm personal interest in him. She sees that he has an opportunity to be dependent when necessary and to be independent when the time comes. She sees that his questions are answered, his fears relieved and that his courage and self-respect are preserved. She fosters healthy family life by helping members of the family to perform their functions in care of

the sick, the young and the old and to grow together during the crises of childbirth, sickness and death. Because her contact with the patient is close and intimate, she is in a position to be aware of his physical and emotional reactions to his disease, treatment or diagnosis. It is part of her function to assist the doctor and others by keeping them informed of these reactions in the patient. She helps the family to understand the patient's needs and how their behaviour affects him. Mrs. MacLeod noted that the skills required by the nurse who is to carry through these functions effectively are numerous, but all nurses need not possess all skills in exactly the same way. Nurses have for some time felt there is a need for nurses functioning in different areas with different kinds of educational preparation. The problems encountered by nurses in their efforts to play their proper role in Canada's health program, fall into two basic areas; to maintain a sufficient supply of nurses giving the quality of care required by changing needs of society, and the education of nurses to perform the functions required of them.

Mrs. Rex Eaton, O.B.E.—
A representative of the lay public.

Mrs. Eaton spoke of the understanding and acceptance of the public in relation to the functions of nursing, and to the division of responsibility between the professional nurse and practical nurse, or certified nursing assistant. She discussed current problems in relation to salaries and conditions of work, and reviewed the experience of the nursing profession in British Columbia in their struggle to improve these conditions. In pointing to the need for satisfactory working conditions she said: "I have given more time than perhaps I should to this phase of the nursing situation, but I have done so for the purpose of assuring you that a thoughtful public has no wish to see nurses sacrifice more than they should on the practical provisions for their personal security. If the necessary numbers of nurses are not trained or if when trained, they leave active nursing because of low salaries and their conditions of work, the public will suffer at critical times of illness when they should be assured of professional care."

SUMMARY OF GROUP DISCUSSIONS—
Miss Dorothy Percy, Chief Nursing Consultant, Department of National Health and Welfare

Miss Percy pointed out that most of the points brought out in discussion would fit under one or more of the following headings: education; finance; utilization; communications; and research.

Education

Education cut across every area of discussion; finance, utilization, communications and research. The conflict between nursing education and nursing service received a good deal of attention; and while there was not complete agreement on where the nurse's basic preparation should take place, that it should be a truly educational experience, seemed to find majority favour. The need for a larger number of nurses with advanced preparation in special fields was stressed. In this connection, improved selection procedures and increased financial assistance for those taking advanced work were deemed of prime importance.

Finance

Much of the discussion centered around the fate of nursing school costs when provincial hospitalization schemes, federally assisted, come into operation. The need for more precise factual knowledge concerning costs was underlined.

Utilization

There seemed to be general agreement that there is failure to make best use of the nurse's time and energy. In this connection some of our "shortages" may be more apparent than real. The adoption of improved management skills, streamlining of some procedures, elimination of other time-honoured ones were among the suggestions which might prove helpful in better utilization of what we already have. Knowing more about what nurses, nursing assistants and others in the team actually do, would be of assistance in setting up job descriptions and defining functions more realistically. Research is very definitely indicated in this area.

Communications

If this Conference has accomplished nothing more than turn the spotlight on the value of improved communication between the individuals representing various groups and disciplines, it might be said to have "earned its passage". This matter of the importance of good communication was touched on by most of the groups. There seemed to be strong realization that there is a great need to sit down together and discuss mutual problems in an atmosphere of trust coupled with a desire to understand and be helpful.

Research

New vistas appeared to open out in this area underlining so many ways in which nursing might be helped by both "minor" and "major" research. Definition, prerequisite conditions, costs, personnel, were some of the facets of the problem of research which received attention.

RESULTS OF THE CONFERENCE

The results of this first National Conference on Nursing cannot be evaluated at this time. One can hope that, through the co-operative efforts of government, the health professions, and the public at large, constructive steps will be taken to reform nursing education and improve nursing service. One can also hope that the opportunity provided for face-to-face relationships and informal discussion will result in better rapport among members of the health team, and a deeper understanding of the problems that beset all those concerned with the implementation of expanding health services. It was clearly illustrated that the objectives of all are the same, and that steps toward the achievement of these objectives will become clearer if we are able to work together toward the solution of our problems.

1. Copies of the report of the Conference may be secured from the Canadian Nurses' Association, 270 Laurier Ave. W., Ottawa. Price per copy 75¢.

SOCIETY OF MEDICAL OFFICERS OF HEALTH—ENGLAND

A communication has been received from Sir Selwyn Selwyn-Clarke, Secretary of the Society of Medical Officers of Health, Tavistock House South, London, England. This is the oldest society of medical officers of health in existence, having celebrated its centennial in 1956.

The Society would like to arrange plans for a reception of Canadian colleagues who will be in the United Kingdom in July 1958 for the joint meeting of the Canadian and British Medical Associations.

The national office of the Canadian Public Health Association, in an effort to assist the Society, requests that any medical or dental officer planning to attend the Edinburgh meeting of the C.M.A.—B.M.A. contact our office at the earliest possible date in order that we may forward requested information to the Society of Medical Officers of Health.

Record of Health Center Visits During 1956

TWENTY-ONE companies in Ontario collected data on the health center visits made by their employees during the calendar year 1956 using the system designed by the Division of Industrial Hygiene and the Division of Medical Statistics, Ontario Department of Health.

A summary of the experience of the 21 companies is presented in Table I; the summary covers 15,561 employees (11,778 males, 3,783 females) with a total of 158,562 visits. Reporting rates are given for visits by sex, and for conditions reported, whether new or repeat, for each company and for all companies combined. Each reporting company is designated according to the Classification of Industry published by the Dominion Bureau of Statistics.

TABLE I—SUMMARY OF VISITS AND CONDITIONS REPORTED TO HEALTH CENTERS OF TWENTY-ONE COMPANIES REPORTING FOR THE YEAR 1956

Reporting Companies	Reporting Rates per Employee per Year					
	Total Visits†			Conditions Reported		
	Male	Female	Both	New	Repeat	Total
1. Food and Beverage	8.1	17.0	11.9	9.5	2.0	11.5
2. Food and Beverage	6.3	9.6	6.6	2.3	1.7	4.0
3. Rubber Products	7.8	10.0	8.4	5.7	1.8	7.5
4. Rubber Products	10.1	6.9	8.7	5.4	2.0	7.4
5. Clothing	13.0	8.1	9.1	3.8	2.2	6.0
6. Paper Products	12.9	19.9	15.7	9.2	3.6	12.8
7. Paper Products	6.2	10.7	6.4	3.6	2.6	6.3
8. Iron and Steel	20.8	17.6	20.0	12.0	6.1	18.1
9. Iron and Steel	8.7	9.4	9.0	5.9	1.6	7.5
10. Iron and Steel	12.2	—	12.2	—	—	—
11. Iron and Steel	15.5	5.7	14.9	10.7	3.8	14.5
12. Iron and Steel	17.0	24.0	18.9	7.8	9.5	17.3
13. Iron and Steel*	9.8	11.0	10.0	6.2	2.4	8.6
14. Electrical Apparatus	4.9	5.0	4.9	3.6	1.2	4.8
15. Electrical Apparatus	14.0	12.5	13.9	8.7	4.4	13.1
16. Electrical Apparatus	12.9	9.7	12.5	6.7	4.2	10.9
17. Electrical Apparatus*	5.8	11.4	8.0	7.1	2.4	9.5
18. Chemical Products	7.8	7.4	7.8	4.2	1.7	5.8
19. Miscellaneous Mfg.*	6.9	8.4	7.1	4.1	2.8	6.9
20. Insurance	6.6	11.7	9.9	5.7	1.7	7.4
21. Services	4.9	14.9	10.3	4.7	3.7	8.4
Mean	10.2	10.0	10.2	5.8	2.8	8.6

†Total visits include conditions of sickness and accident, plus interviews, physical examinations, and miscellaneous services.

*Nine-month experience adjusted to one year.

From further information supplied, rates and percentages were calculated, and are shown in Table II. The first two sections of this table present the combined experience of 20 companies; Section I shows total conditions divided into new or repeat and occupational or non-occupational, Section II shows new conditions divided into sickness or accident and occupational or non-occupational. Fifteen of the companies provided additional data which have been summarized in the form of the seven condensed diagnosis groups that make up the new conditions reported; this material is presented in Section III.

TABLE II—SUMMARY OF CONDITIONS REPORTED TO HEALTH CENTERS, YEAR 1956

Conditions Reported	Reporting Rate per 100 Employees per Year	Percent of Conditions Reported
I Total conditions reported (New and Repeat)†	864	100.0
New non-occupational	371	42.9
New occupational	213	24.7
Repeat non-occupational	173	20.0
Repeat occupational	107	12.4
II All new conditions reported (Class-Division)†	584	100.0
Non-occupational sickness	329	56.3
Occupational sickness	6	1.0
Non-occupational accident	42	7.2
Occupational accident	207	35.5
III All new conditions (Condensed Diagnosis Groups)‡	598	100.0
Acute upper respiratory infections	91	15.2
Other respiratory diseases	4	0.7
Diseases of digestive system	44	7.4
Menstrual disorders	63*	3.0
Symptoms and ill-defined conditions	103	17.2
Accidents and violence	264	44.1
Other specified causes	72	12.4

†Based on combined experience of 20 companies.
‡Based on combined experience of 15 companies.
*Based on female populations.

These figures are presented for the purpose of indicating the type of inter-company comparison that may be made when a number of industries use a standardized recording procedure. The usefulness of such data to industry is enhanced when comparisons can be made from year to year (1).

It is emphasized that all of the rates are crude rates; they are not corrected for differences between the companies in respect of such factors as age, type of work, and company policy regarding the use of health center facilities, all of which are known to affect the reporting experience. Another important factor which vitiates comparison is the variation between companies in the counting of visits reported to first-aid personnel. Comparison of the rates for any two companies, or for any company with the rate for the group as a whole, should not be made without due consideration of these facts.

Division of Industrial Hygiene and Division of Medical Statistics
Ontario Department of Health

REFERENCE

1. Canad. J. Pub. Health, 1957, *48*: 32.

ASSOCIATION NEWS

British Columbia Branch

Dr. G. R. F. Elliot, President of the Western Branch of the American Public Health Association, Dr. J. A. Taylor, Member of the Regional Board, Dr. Stewart Murray, President of the Canadian Public Health Association and Dr. A. J. Nelson, Chairman of the Program Committee of the joint meeting of the two associations, May 19–23, 1958, attended a one-day meeting of the Regional Board of the Western Branch in Portland on December 7.

To create a feeling of solidarity among public health workers in Vancouver and nearby municipalities the holding of a semi-annual meeting was proposed at an executive meeting of the B.C. Branch. The suggestion was made by Mr. W. S. Wookey, Sanitation Control Officer, Metropolitan Vancouver Health Committee, and was quickly transformed into reality by the members of the branch executive. Two excellent speakers were secured and an inviting meeting hall. The promise that it would be "an evening to remember" drew a membership audience of over 80 people.

Miss Trenna G. Hunter, R.N., B.A.Sc., Director of Nursing, Metropolitan Health Committee was the first speaker. She had recently returned from a tour of Europe, where she represented Canada as the President of the Canadian Nurses' Association at the XIth Quadrennial Congress of the International Council of Nurses held in Rome, Italy. Dr. Lionel A. Kerwood, the Medical Superintendent of Woodlands School for Retarded Children (Provincial) discussed the socio-economic aspects of retardation and he gave a vivid picture of what happens in a family with a mentally defective child. The revealing statistics that Dr. Kerwood quoted made a visible impression on the audience, and the question period following his talk showed a genuine interest in the problem of mental retardation.

The branch President, Dr. Susan McMaster, thanked Miss Hunter and Dr. Kerwood.

Laboratory Section

Over 100 members of the Laboratory Section, Canadian Public Health Association attended the twenty-fifth anniversary meeting of the section held at the King Edward Hotel, Toronto, on December 9 and 10. A highlight of the meeting was the anniversary luncheon attended by 75 members at which Dr. Clare Wicks gave a fascinating account of "A Flying Trip to India" illustrated with coloured slides. The scientific papers were excellent and stimulated much lively discussion. An informal "social hour" was held at the close of the session on the first afternoon and was enjoyed by many members. A brief business meeting was held after the anniversary luncheon. The following officers were elected for the year 1958: Chairman: Dr. J. C. Wilt, Vice-Chairman: Dr. N. A. Hinton, Secretary: Dr. F. O. Wishart, Council Members: Dr. Sorin Sonea, Dr. E. J. Bowmer, Dr. George Dempster, Dr. C. E. van Rooyen, Dr. Fritz Blank.

Atlantic Branch (Nova Scotia)

The seventh annual meeting of the Atlantic Branch was held at the Cornwallis Inn, Kentville, N.S. on November 6–8, 1957 and was attended by nearly 200 members and guests. Among the visitors were the following members of the New Brunswick-Prince Edward Island Branch executive: Miss Mona

Wilson, Dr. R. S. Langstroth, Dr. R. D. Landry, Miss J. Ray McKenzie, Dr. B. J. O'Meara and Mr. Giles Cantwell. The annual dinner was held on November 6 under the sponsorship of the Department of Public Health, Province of Nova Scotia. The guest speaker was the Honourable R. Clifford Levy, Minister of Municipal Affairs and Minister of Lands and Forests, Province of Nova Scotia. Awards of membership emeritus were presented to Mrs. J. A. Hanway, M.B.E., and Dr. J. J. MacRitchie, both of Halifax. Greetings to the Association were conveyed from the Town of Kentville by Mayor Gladys Porter, from the New Brunswick-Prince Edward Island Branch by Miss Mona Wilson, from the Nova Scotia Medical Society by Dr. Arthur Murphy, from the Registered Nurses Association by Miss Jean Church, R.N. A dance was held following the dinner.

Dr. Samuel Marcus, President of the Atlantic Branch, welcomed the members on November 6 and titles of papers presented that day included "Industrial Nursing and Public Health," "Pathology of Pneumonias in Infancy," "Recent Developments in Cancer Research," "Heart Disease as a Public Health Problem" and "Accident Prevention." On Thursday morning papers were presented on "Industrial Medicine," "Refuse Disposal," "Vital Statistics in Nova Scotia" and "Modern Trends in Mental Health Programs." The afternoon session featured a panel discussion on the subject of "School Health" and the evening was devoted to the Section on Diseases of the Chest and presentation of papers on the subject of tuberculosis. The discussion on Friday morning included the subjects of maternal and infant illness and mortality, food plant inspection and fluoridation in eastern Canada.

The interest and support of the following Sustaining Members were much appreciated: Dominion Steel and Coal Corporation Limited, The T. Eaton Co. (Maritimes Limited), Oland & Son Limited, Mersey Paper Company Limited.

The following officers and executive members were elected for the year 1957–58: Past President, Samuel Marcus, M.D.; President, J. C. Wickwire, M.D.; 1st Vice-President, J. E. Hiltz, M.D.; 2nd Vice-President, W. J. Chisholm, B.Sc.; Secretary-Treasurer, W. I. Bent, M.D. Executive: Miss P. J. Lyttle, R.N., Allan Morton, M.D., D. S. Robb, M.D., Mrs. Greta Scott, R.N., Mr. Frank Wellard.

NEWS NOTES

International

The 85th annual meeting of the American Public Health Association was held in Cleveland, Ohio, November 11–15. Deep sorrow was expressed by members and friends of the late Dr. Reginald M. Atwater who had served as executive secretary of the Association since 1935. Dr. Berwyn F. Mattison was named as Dr. Atwater's successor. Dr. Mattison was formerly secretary of health of Pennsylvania.

Dr. Roy J. Morton, associate director of the Engineering Section, Oakridge National Laboratory, assumed his duties as president of the American Public Health Association and Dr. Leona Baumgartner, New York City's Health Commissioner was named president-elect. Dr. Arnoldo Gabaldon, Venezuela; Dr. Morley S. Lougheed, Winnipeg; and Dr. Thomas F. Sellers, Georgia; were named vice-presidents and Dr. Charles G. King, New York, treasurer.

The first recipient of the newly established Presidential Citation of the American Public Health Association "for exceptional service to public health" was Rep. John E. Fogerty of Rhode Island, chairman of the House Appropriations Subcommittee on Health, Education and Welfare. The award, in the form of a plaque, was presented by the president, Dr. John W. Knutson, assistant surgeon general and chief dental officer of the United States Public Health Service at the first general session of the Association's annual meeting.

Federal

Royal Assent was given on November 21 to a bill to amend the Disabled Persons Act. This measure provides for an increase to $55 per month in the maximum amount of the allowance for which payments may be made to the provinces; for payments, subject to regulations, in respect of certain additional persons who are patients in institutions; and for an increase in the total amount of allowable income.

Dr. J. H. Grove, chief, blindness control division, Department of National Health and Welfare, attended a symposium on the visual factors in automobile driving held in Washington, D.C. early in November.

Dr. C. A. Roberts, principal medical officer, Health Insurance Studies, and chief, mental health division, Department of National Health and Welfare, left government service early in December to become medical superintendent of the Verdun Protestant Hospital, Montreal. For the time being, the health insurance program will be supervised directly by Dr. K. C. Charron, director of health services. Dr. E. H. Lossing, chief, epidemiology division, has moved to the Health Insurance section, and Dr. Lossing and Dr. R. B. Goyette will assist Dr. Charron with this program. Dr. D. Kubryk is now responsible for the program of the epidemiology division, and Dr. J. E. Gilbert, consultant in psychiatry, is in charge of the work of the mental health division.

The 13th annual meeting of the technical advisory committee on public health laboratory services was held in Ottawa early in December under the chairmanship of James Gibbard, chief, Laboratory of Hygiene, Department of National Health and Welfare.

Dr. E. J. Young, D.P.H., formerly Eastern Command Officer of the Canadian Army Halifax Central Command, has joined the staff of the Department of National Health and Welfare as deputy director, civil defence health services.

A national health grant of nearly $28,000 has been approved to help meet the costs of setting up a new health unit for Port Arthur and District in Ontario. The new unit serves about 45,000 people.

Dr. W. H. K. Ross, formerly on the staff of the Royal Ottawa Sanatorium, has joined the Department of National Health and Welfare as a medical officer in the immigration medical services.

Miss Dorothy M. Percy, chief nursing consultant, and Dr. R. B. Goyette, Health Insurance Studies, Department of National Health and Welfare, took part in a panel discussion on hospital insurance at the annual meeting of the Quebec Association of Nurses in Montreal on November 7. Miss Percy also participated in an institute for directors of schools of nursing in Ontario, held at McMaster University, Hamilton, early in December.

Hospital construction grants recently approved under the National Health Program include: *British Columbia*—Kelowna Community Health Centre, $740; *Ontario*—Cottage Hospital, Uxbridge, $35,846; St. Jean de Brebeuf Hospital, Sturgeon Falls, $10,460; *Quebec*—Hôpital St-Ambroise de Loretteville, Loretteville, $98,000.

Dr. J. H. Wiebe, eastern region superintendent, Indian and Northern Health Services,

Department of National Health and Welfare, is taking postgraduate work in public health this year at Johns Hopkins University, Baltimore, U.S.A.

At the fall clinic of the Montreal Dental Club Dr. W. J. D. Cooke, radiation services, occupational health division, Department, of National Health and Welfare, presented a paper outlining the hazards of X-rays in dental radiography and methods of producing good radiographs with the least possible dose to patient and operator.

Misses Dorothy Sinclair and Therese Lafortune, nutrition division, Department of National Health and Welfare, recently carried out a study of the food habits of senior citizens in Moose Jaw, Saskatchewan.

Frank Goudge, formerly with the civil service health division, Department of National Health and Welfare, has transferred to the Indian and Northern Health Services as an administrative officer.

Morris Katz, Ph.D., consultant in air pollution, and other members of the occupational health division, Department of National Health and Welfare, working in co-operation with the research and engineering branches of the Canadian National Railways, recently carried out an investigation of the toxic exhaust gas conditions caused by the operation of diesel locomotives in the St. Clair tunnel.

P. J. Lupien and R. E. C. Yarnell, biochemists, and Mrs. B. Balla, sociologist, all from the nutrition division, Department of National Health and Welfare, recently visited British Columbia where they obtained material for a nutritional evaluation of Hungarians in the transit camp at Abbotsford and the Sopron School of Forestry, University of British Columbia.

On November 5 and 6 the Canadian Nursing Conference was convened at Ottawa. Representatives of the federal, provincial, and city departments of health participated in the Conference. Chairman of the sessions was Dr. Malcolm Taylor and the group leaders were Gordon Hawkins, Canadian Association for Adult Education, Rev. F. J. Smyth, Catholic Hospital Association, Gladys Sharp, Director of Nursing, Toronto Western Hospital. Dr. C. A. Roberts and Dr. Ernest Watkinson, Department of National Health and Welfare, Dr. Leonard Miller, Deputy Minister of Health, Newfoundland, Dr. Stewart Murray, of Vancouver, Dr. Gerald LaSalle, Montreal Hospital Council.

School of Hygiene, University of Toronto

At a "Breakfast Meeting" held in Cleveland during the American Public Health Association Meeting (November 13, 1957) the assembled members of the "Graduates Organization" of the School of Hygiene, University of Toronto, decided to change the name to the "University of Toronto, School of Hygiene, Alumni Association." The President, Dr. A. F. W. Peart, presented the recommendation of the Committee in the form of a draft Constitution for the new organization. This was discussed and accepted enthusiastically.

The newly elected officers are: Honorary President—R. D. Defries; President—J. H. Baillie; Vice-President—G. F. Amyot; Secretary-Treasurer—D. L. MacLean.

The new Constitution provided also for the election of certain members to "Senior Membership". Dr. F. W. Jackson was unanimously elected to the first Senior Membership. It was proposed that meetings of the Alumni Association be held at the annual meetings of the Canadian Public Health Association as well as at the American Public Health Association annual meetings.

Those present included the following: R. M. Aldis, G. F. Amyot, G. L. Anderson, R. J. Avery, M. H. Brown, B. Bucove, U. P. Byrne, R. G. Cadham, M. Cahoon, L. A. Clarke, R. Connor, E. L. Davey, M. R. Elliott, C. P. FitzGerald, J. Gilbert, R. P. Hardman, W. E. Henry, C. M. Hoffman, D. A. Hutchison, R. A. Kennedy, B. D. B. Layton, E. H. Lossing, E. Mastromatteo, J. M. Mather, V. L. Matthews, D. G. H. MacDonald, D. L. MacLean, G. T. Mitton, S. S. Murray, A. F. W. Peart, A. J. Rhodes, F. B. Roth, A. H. Sellers, C. E. Smith, D. C. Smith, L. W. C. Sturgeon, A. B. Sutherland, R. B. Sutherland, J. P. Wells, E. R. Westman, R. J. Wilson.

Ontario

Dr. William Gordon Brown has been appointed Deputy Minister of Health succeeding Dr. J. T. Phair. Dr. Brown was born in Toronto and graduated from the University of Toronto in 1928. He interned in New York city for two years and entered private practice in Grey County, Ontario, in 1930. In 1934 he moved to Tientsin, China, and there continued in private practice until 1936. From 1936 to 1941 he was Superintendent of a general hospital at I'Chang, a treaty port on the Yangtze river, serving also in the capacity of Port Quarantine Officer and Regional Representative of the International Red Cross. Following Japanese occupation of that area, Dr. Brown returned to Canada and received a Rockefeller Foundation Fellowship for postgraduate study. He qualified for the Diploma in Public Health in 1942 and was appointed Medical Officer of Health for the city of Fort William and Provincial Medical Officer

for North-western Ontario. He joined the Provincial Department of Health in 1944 and has been holding the posts of Director of the Division of Venereal Disease Control, Director of the Division of Maternal and Child Hygiene, and since January of 1957 has been Chief Medical Officer of Health. Dr. Brown is a certified specialist in public health, a member of the Canadian and American Public Health Associations, and a fellow of the Royal Society of Tropical Diseases. Dr. Brown married Dr. Isabel Ruthven Menzies in 1928 and they have three children.

Fourteen sanitary inspector trainees wrote the November examinations for the Certificate in Sanitary Inspection (Canada). Twelve of the candidates were successful in the examinations and were awarded the C.S.I.(C) Certificate. One candidate will be required to sit for a supplementary examination in one subject at a future date. One other candidate failed and will have to repeat the examinations. The successful candidates were: *A. A. Anderson*, Yorkton, Sask.; *Robert A. Angell*, Vancouver, B.C.; *Morris A. Bjorgan*, Swift Current, Sask.; *Adelard G. Bouchard*, Victoria, B.C.; *Nick Catchuk*, Rosetown, Sask.; *Walter C. Fuhr*, Spring Valley, Sask.; *Michael Gushulak*, Prince Albert, Sask.; *Norman Lewis*, Vancouver, B.C.; *John Marshall*, Windsor, Ont.; *Clunie J. Pitcairn*, Charlottetown, P.E.I.; *Robert A. Steeves*, Hillsboro, N.B.; *Donald C. Taylor*, Victoria, B.C.

Miss Isobel Black, B.S.M.A., has been appointed Director of the Division of Public Health Nursing in the Ontario Department of Health succeeding Dr. Edna Moore. Miss Black is a graduate of the Victoria Hospital School of Nursing, London, Ontario. She was formerly Assistant Director of this Division and majored in public health nursing supervision and administration at Columbia University, New York.

Cornerstone laying ceremonies were held recently for the new wing of the Ontario Hospital, Penetanguishene. The building should be ready for occupancy about the end of the year and will have 150 beds which will allow for the total accommodation of 750 patients.

Prince Edward Island

Miss Mona Wilson, Director of Public Health Nursing and President of the N.B.-P.E.I. Branch of the C.P.H.A., Dr. B. J. O'Meara, Director of Dental Public Health, and H. Giles Cantwell, Chief Sanitary Inspector attended by invitation the annual meeting of the Atlantic Branch (Nova Scotia) of the C.P.H.A. held in Kentville, N.S. While there, Mr. Cantwell also attended special meetings of the Canadian Institute of Sanitary Inspectors (Atlantic Branch) held in conjunction with the C.P.H.A. meeting.

Under the provisions of the federal Medical Rehabilitation grant, treatment of persons qualifying under the terms of the grant will be provided through the establishing of a treatment center at the Orthopaedic Centre in Charlottetown. The program, at present, will be limited to children 16 years and under who are chronically disabled. A medical assessment board has been established to appraise the eligibility of a person to receive treatment. Constituting the board are Dr. T. A. Laidlaw, surgeon, Dr. John Downing, internist, Dr. John Theriault, Dr. T. Gencheff, orthopaedic surgeon. The program applies only to those chronically ill.

The number of people receiving tuberculin tests in the Tuberculin Testing Survey (Heaf) currently being carried on in the Province has reached approximately the 25,000 mark. Nearly one-third of those tested had positive reactions. Eight active cases have been found from the 8,000 X-rays taken for an average of one active case per 1,000 miniature X-rays.

Nova Scotia

Mrs. Juliana Pilecki, a 1957 graduate from the Eastman Dental Dispensary, school for Dental Hygienists, has recently been appointed to the position of dental hygienist, Department of Public Health. Mrs. Pilecki will be employed in the Western Health Region. There are now five dental hygienists working on a dental health program for preschool children and school children in the elementary grades.

The annual Provincial Public Health Nurses' staff conference was held in Kentville on November 4 and 5, 1957. The highlight of the conference was a day spent on mental health and we were privileged to have Dr. Eric Cleveland, Dr. Ralph Townsend, Dr. Marion Grant, and Miss Godfrey of the Fundy Mental Health Clinic. Mr. Tom Jones, Assistant Director of Adult Education for the Province of Nova Scotia was chairman of the afternoon session. On November 5 a display entitled "Casualty Simulation" was presented by federal and provincial civil defence workers under the direction of Miss Evelyn Pepper, Chief Nursing Consultant for Federal Civil Defence, and Miss Elizabeth Manning, Nursing Consultant, Provincial Civil Defence. The Provincial Public Health Nursing Staff then joined the members of the Atlantic Branch of the Canadian Public Health Association in their meetings.

The town of Lunenburg has recently commenced chlorination of its water supply. A very modern gas chlorinator has been installed and put in service. In our towns and cities with populations exceeding 2,000, only 4.6% of the residents are now supplied with untreated surface water. Even this proportion is too high and it is to be hoped it will soon be reduced. It is gratifying when another town joins the ranks of enlightened communities and the Division of Environmental Hygiene wishes to pay particular tribute to Dr. Zinck, the local Medical Health Officer and Dr. Bent, the Divisional Medical Health Officer.

New Brunswick

The Hon. Dr. J. F. McInerney, Minister of Health and Social Services has announced the appointment of Dr. Mary Southern-Holt as Director of Maternal and Child Health for his Department. This appointment fills the vacancy created last September by the resignation of Dr. J. R. Mayers. Dr. Holt took post-graduate studies at the University of London, Institute of Child Health and was awarded her Diploma of Child Health by the Royal College of Physicians and Surgeons of England. She also studied at Rotunda Hospital, Dublin, where she carried out post-graduate work in obstetrics, gynaecology and care of the new born. Dr. Holt came to Canada in September and her appointment with the Department of Health and Social Services became effective on January 1, 1958.

Hon. Dr. J. F. McInerney, Minister of Health and Social Services with Chief Medical Officer, Dr. J. A. Melanson, and Director of Health Planning Services, Dr. C. W. Kelly attended a meeting in Halifax on December 4 of Atlantic Province Ministers of Health and their consultants. The purpose of the meeting was to hold preliminary discussion in preparation for an Ottawa conference of provincial and federal health authorities on December 11 to 13.

The appointment has been announced of Dr. George H. Blennerhassett as Medical Superintendent, Moncton Tuberculosis Hospital to fill the vacancy created by the sudden passing last fall of Dr. P. M. Knox. Dr. Blennerhasset came to Canada in 1953 and was on the staff of the Muskoka Sanatorium, Ontario. For the past three years he has been senior physician at Middlesex County Sanatorium, Waltham, Massachusetts and also directed treatment services there as well as holding a teaching appointment at Harvard Medical School. Dr. Blennerhassett's appointment became effective on December 1.

The Hon. Dr. J. F. McInerney, Minister of Health and Social Services has announced the promotion of Dr. H. C. Bird from Assistant to Director of Provincial Laboratories to fill the vacancy created by the death of the late Dr. R. A. H. Mackeen. Dr. Bird joined the Provincial Laboratory services in 1946 when he became assistant in Pathology at the Provincial Laboratory in Saint John. In 1947 and 1948, Dr. Bird was attached to Tufts College Medical School in Boston where he held a similar post of Assistant in Pathology. He returned to the New Brunswick Laboratory services in 1949 when he was made assistant director. Dr. L. A. MacLennan will assume the position of associate director in addition to his present position as Director of the Provincial Regional Laboratory in Moncton. Dr. MacLennan became Director of the Regional Laboratory in Moncton in 1953 when the institution was newly opened. Previous to that he was Pathologist to the Moncton Hospital starting in 1946. Dr. MacLennan also has held the post of Pathologist to the Hotel Dieu in Moncton since 1953.

Manitoba

Dr. Emanuel Snell, a native of Glasgow, Scotland, has been appointed Medical Director of the Portage la Prairie Health Unit. Dr. Snell graduated in medicine from the University of Glasgow in 1939, and obtained his diploma in Public Health from the University of Manchester. He spent six months at the St. John's Sanatorium, Newfoundland, before coming west.

A 1953 graduate of St. Mary's Hospital, University of London, Dr. Eric Benson has arrived in Canada from Bristol, England, to take over the duties of medical director of the Northern Health Unit, at Flin Flon, Manitoba.

The influenza outbreak in the province of Manitoba appears to be on the wane, according to Dr. R. M. Creighton, Director of Preventive Medical Services, who advises that the number of cases reported in the province now totals 28,443, whereas the total estimated number of cases reported daily has been reduced from the peak of 1,500 to 15 a day.

Alberta

A new health unit, to be known as the North Eastern Alberta Health Unit, has been established with its headquarters at St. Paul, 140 miles east-north-east of Edmonton. Sub-offices will be located at Smoky Lake and Bonnyville. Staff appointments have not yet been completed, but it is expected that services will commence early in the new year.

Books and Reports

THE PUBLIC HEALTH INSPECTOR'S HANDBOOK, A MANUAL FOR PUBLIC HEALTH OFFICERS, Henry H. Clay, F.R.S.H., F.I.P.H.E., assisted by Ronald Williams, O.B.E., D.P.A., F.R.S.H. H. K. Lewis & Co. Ltd., London, ninth edition, 1957, 614 pp., 101 illustrations, £2 net.

Clay's Public Health Inspector's Handbook was first published in 1933. This is the ninth edition. It occupies an authoritative place among public health textbooks. For many years the author was lecturer in the Division of Public Health in the London School of Hygiene and Tropical Medicine. Sanitary inspectors in Canada will find this volume very helpful although it is designed primarily for public health inspectors in Great Britain. In keeping with the statutory changes the designation public health inspector has been adopted throughout the text.

PREVENTION OF CHRONIC ILLNESS, Volume I. Commission on Chronic Illness Published for the Commonwealth Fund by the Harvard University Press, S. J. Reginald Saunders & Co. Ltd., Toronto. 1957, 338 pp. $6.60.

The Commission on Chronic Illness in the United States is an independent national agency to study the problems of chronic disease, illness and disability. It was founded by the American Hospital Association, American Medical Association, American Public Health Association, and the American Public Welfare Association.

The problem of chronic illness is occupying more and more a major place in the consideration of public health authorities. In 1950, it was estimated that there were 28,000,000 persons in the United States suffering from disabling and non-disabling chronic disease or impairment. Two major aspects are the prevention of either occurrence or progression and the care and rehabilitation of those who are ill or disabled. This volume is the first of the four-volume report, "Chronic Illness in the United States". Part I of this volume presents twenty-one conclusions and requirements concerning prevention which were adopted by the Commission in February 1956. These are the findings of a seven-year program of study. This volume and the three succeeding volumes will find a place among the most valued books in all health departments.

THE CENTURY OF THE SURGEON, Jurgen Thorwald, Pantheon Books, 333–6th Ave., New York 14, 1957, 432 pp., $6.50.

This is a book for non-medical as well as medical persons. It traces the march of surgery beginning with the accidental discovery of anaesthetics to the development of surgery as an art. In order to create a continuity in the story of the development of surgery and to show it as a happening in the life span of one man, the author has chosen the narrative device of an eye-witness. Through the eyes of a young physician the reader participates in the excitement of the operations and comes to know the personalities of the great surgeons. The author brings medical history to life.